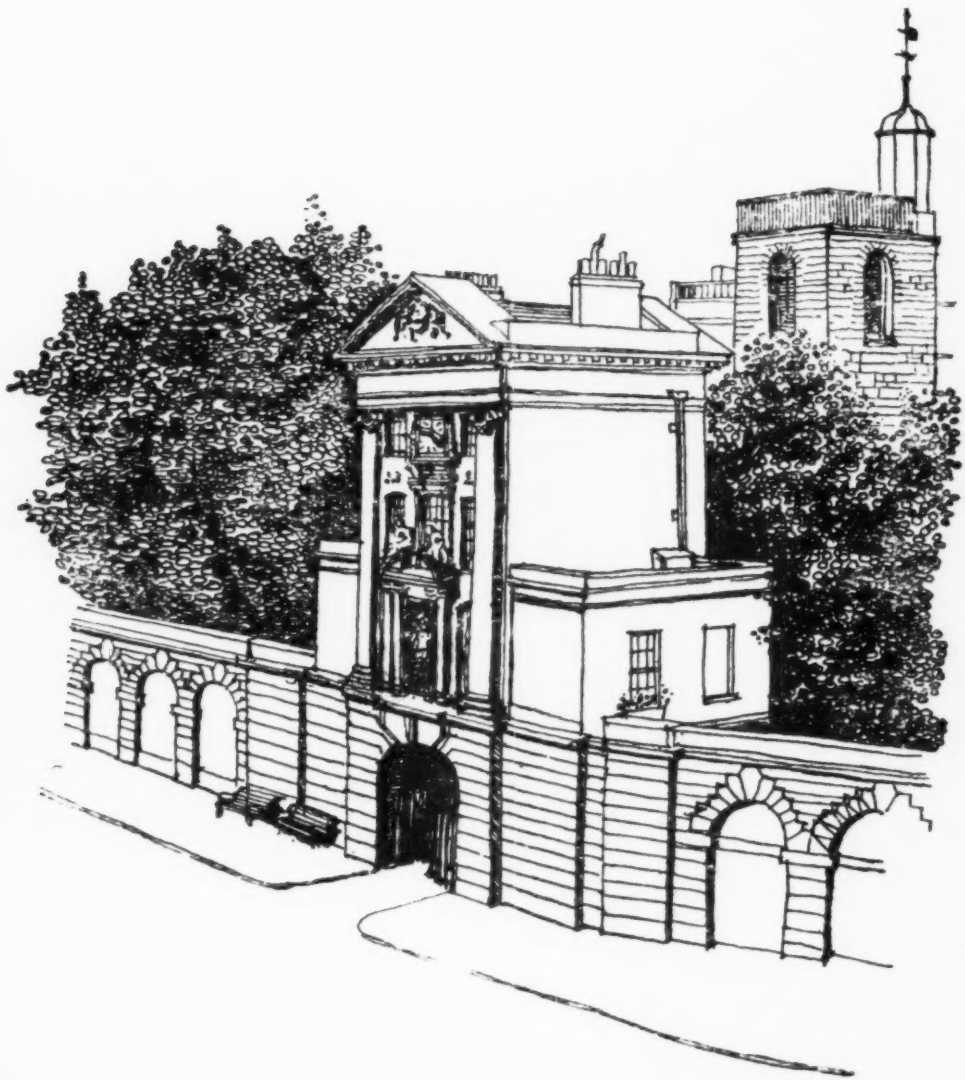
ST. BARTHOLOMEW'S HOSPITAL JOURNAL



VOL LXI MAY 1957 No 5

ST. BARTHOLOMEW'S HOSPITAL JOURNAL

Editor : J. S. PRICE
Assistant Editor : J. K. CHONG
Sports Editor : R. J. MITCHELL
Manager : C. J. CARR

Assistant Manager : M. I. D. CAWLEY
Women's Representative : MISS N. COLTART
Charterhouse Representative :
MISS A. M. MACDONALD

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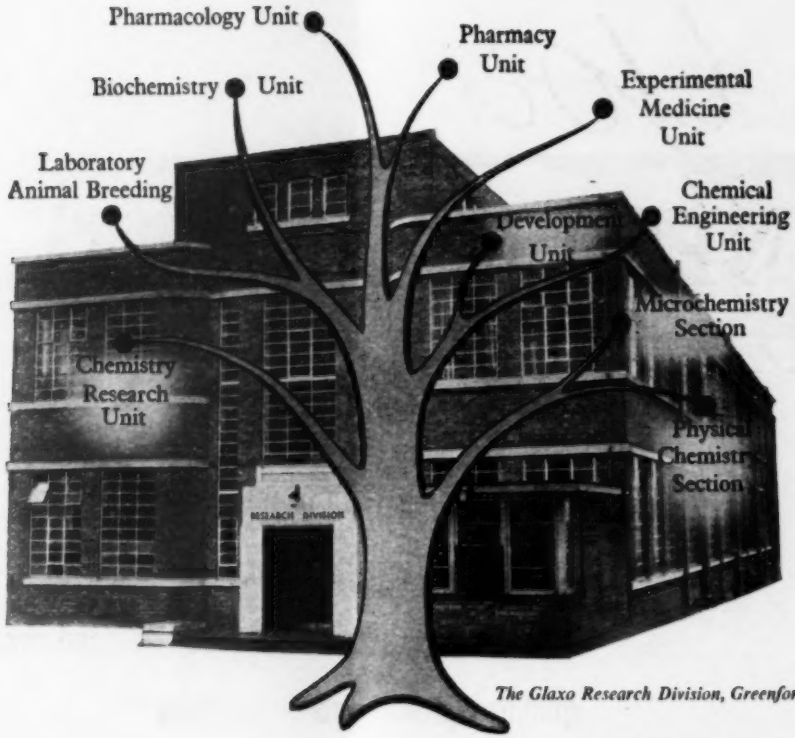

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M.391

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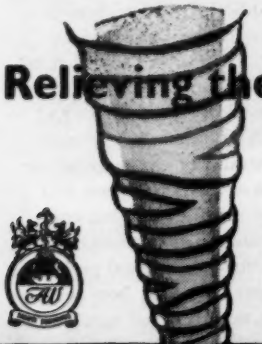

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'Asmac' Tablets combine in a single prescription 'official' drugs recognized for their reliability to effect mental sedation, decongestion, expectoration and bronchodilatation.

Packs and Cost to Pharmacists:
Standard Tube of 20 : 3/-
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M.372

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Allobarbitone B.P.C.	0.03 g. (0.46 grain)
Liquid extract of Ipecacuanha B.P.	0.02 ml (0.34 minim)
Ephedrine Hyurechloride B.P. ...	0.015 g. (0.23 grain)
Caffeine B.P.	0.10 g. (1.54 grains)
Theophylline with Ethylenediamine B.P	0.15g.(2.31 grains)

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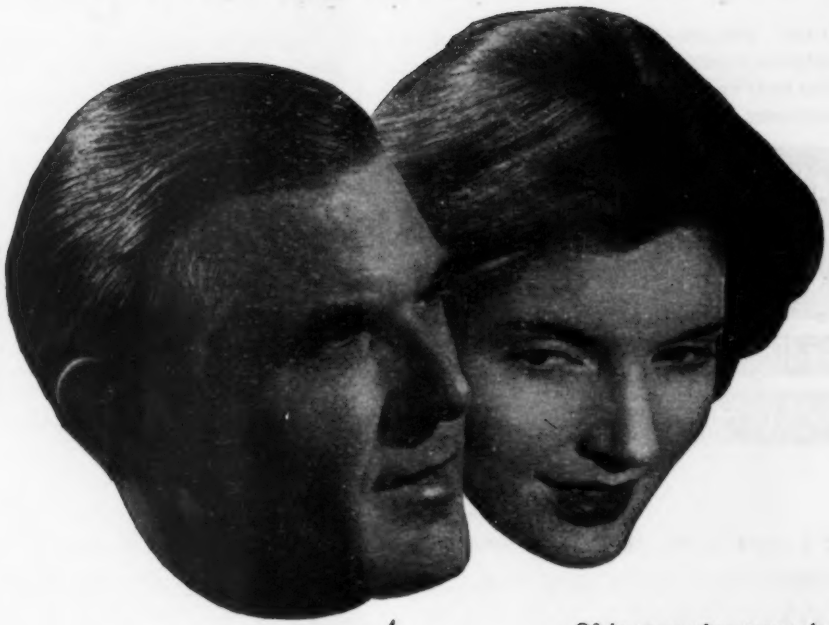

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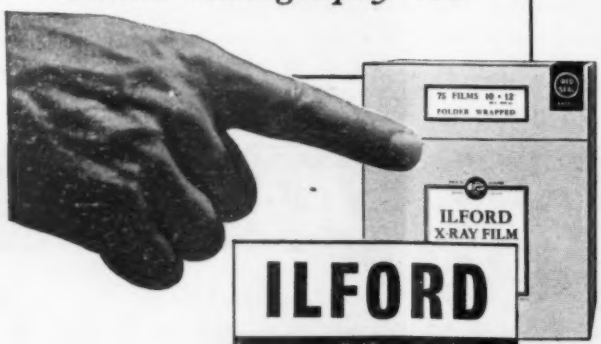

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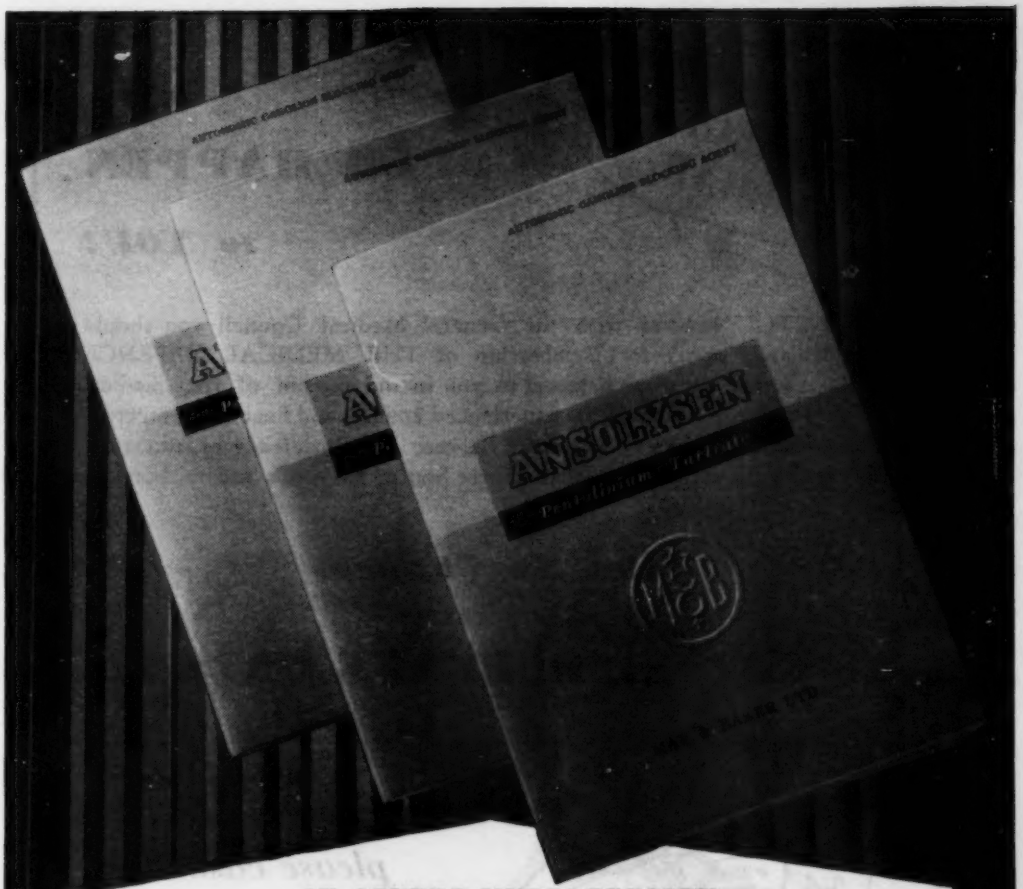

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CUP FINAL TEAM 1957

M. J. A. Davies, R. R. Davies, J. C. Dobson, B. Richards, A. H. Thomas,
Dr. C. W. Havard (*Linesman*), G. J. Halls, L. R. Thomas, D. A. Lammiman, B. W. D. Badley, D. A. Richards, Mr. K. John (*Referee*),
D. W. Roche, R. M. Phillips, J. C. Mackenzie (*Captain*), C. J. Carr, J. S. T. Tallack.

ST. BARTHOLOMEW'S HOSPITAL JOURNAL

Vol. LXI **MAY 1957** **No. 5**

EDITORIAL

CENTENARIES are generally accepted as good excuses for talking about things; and at a time when we are drifting rather diffusely into the first centenary of the use of the experimental method in the Biological Sciences, it would seem not unreasonable to spend a little time talking about research. This tenuous argument derives body from the article on medical student research by Mr. J. T. Silverstone, which appears on a later page of this *Journal*. The rather staggering list of discoveries by students which he presents stimulates comment, and we will tread delicately round the subject, trying to create an atmosphere without going so far as to steal his fire.

Is student research a good thing? This question, not quite so rhetorical as it sounds, places us in a fundamental relationship to the whole problem. The copybook answer is Yes, on the grounds that if students get interested in research they will continue it as practitioners; and the more practitioners doing research, the more discoveries that will be made, and discoveries are a good thing. This, to use rather an offensive simile, is a variation of the old argument that if you sat a lot of monkeys down in front of a row of typewriters and taught them to type, one of them would eventually produce a Shakespearean sonnet. The argument is feeble though colourful, and usually gets the obvious retort that monkeys have far better things to do than type sonnets. The answer transfers poignantly to medical practitioners, and also with a stretch of the imagination to students. In fact, the student bent earnestly over his test tubes, elucidating some tantalising facet of the Natural Law, is a bad candidate for absorbing that Culture which we have laboured rather *ad nauseam* in the previous two editorials.

Let us take a more personal note and consider the student as a personality struggling to justify itself in a challenging and competitive world. As age creeps up on him and his friends in other fields are leading men heroically into battle or stinging their consciences from the pulpit, he wanders unobtrusively round his ward, taking blood here, doing a dressing there, perhaps passing himself off to his patients as a rather adolescent-looking registrar, perhaps later exposed in his lowly garb in front of their credulous eyes. How, to use a nauseating but useful phrase, does he justify his Ego? This, it might be thought, is an old problem. But it has a television-age colouring to it. In the past there were various ways of achieving the inner satisfaction of a job well done: there were smoking concerts and other varieties of constructive entertainment, and of course people used to write for the *Journal*. Now there is sport, one of whose main functions must surely be to provide these very satisfactions, but many of the old channels are closed or neglected. Research, by the individual or in a team, is a method of giving the student at least the illusion that he is doing something constructive.

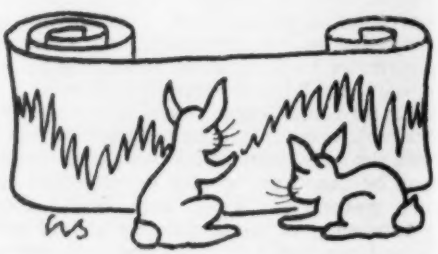
It is easy to blame curricula, Authorities and lack of funds for the paucity of student research now in progress. But one cogent deterrent lies nearer home; namely, Social Pressure. In the terminology of a recent contributor to the *Journal*, research is an S-activity, and "it is distinctly non-U to be S." Since for some strange reason it seems to be desirable to be U, the incipient 'researcher' feels the displeasure of his colleagues, which may be unspoken, or may be verbalised in such epithets as 'Trog' and 'Scab.' This phenomenon of social pressure should not be underestimated; it is a strong trade union

system which lacks only union cards and contributions, and in this instance serves the function of reducing the standard of student achievement to a level compatible with the way of life of the average easy-going fellow. In an age of fairly unlicenced competition, it makes life livable.

But to the student who desires his life to be creative rather than livable, this *Journal* offers hope and inspiration. In Mr. Silverstone's article lies the basis for a different set of social norms. An article which leaves us with just a vague feeling of hopelessness and inadequacy may, if carefully ingested, stimulate the good student to wild feats of emulation. It is in these great names rather than his contemporaries that he must look for a tolerant and encouraging society.

If, on the other hand, research is to become a toy of the majority rather than a dedication of the eccentric, it is not by the provision of funds, time and apparatus that the desired state will be attained. Research must not become just another subject in a top-heavy curriculum, but rather it must permeate as an attitude of mind into all the teaching in the hospital. The questions must subtly change from "How do you treat . . ." to "How could you treat . . ." One promising sign is the great success of all ventures in which students participate in teaching, from the presentation of cases in out-patients to the lecturettes which they give in pathology and psychiatry. This trend should be encouraged in other departments, and could well be given a research flavour.

Perhaps it is better that if we are going to have student research, it should concern the majority rather than the few. After all, we are living in quantitative and statistical times. And one can't help realising that there are an awful lot of monkeys. Why merely teach them to type—why not also tell them how to write poetry?



Cambridge-Bart's Club

A light blue correspondent writes:

The Sixty-Seventh Annual Dinner of the Cambridge Graduates Club of St. Bartholomew's Hospital was held on Friday, 29th March at the Royal College of Surgeons under the Chairmanship of Sir Henry Dale, O.M., a hundred and three members and guests being present.

In proposing the health of the Club, the Chairman referred to the loss sustained by the death of thirteen members. He congratulated Dr. H. W. Balme on his election to the staff. He welcomed younger members and made special reference to Mr. J. C. Mackenzie, Captain of the Rugger Team who had come so near to winning the cup in the replay of the Final a few days before. Among the senior members he referred especially to Sir Geoffrey Keynes who had recently held a 70th birthday party at Bart's and to Dr. Charles F. Hadfield who had been at school, Cambridge and Bart's with Sir Henry. Finally he wondered whether the great characters of the past had their counterpart in the present when science had to some extent usurped the art of medicine. Professor E. T. Spooner gracefully proposed the guests referring to the strong M.R.C. element present and making special reference to Sir Landsborough Thomson, Second Secretary of the Medical Research Council. Sir Landsborough Thomson made a polished and most entertaining reply on behalf of the guests. Dr. George Graham's proposal of the toast of the Chairman's health was illuminated by various reminiscences about Sir Henry, among them Gee's advice to leave physiology behind when he entered the wards. In replying, Sir Henry disclosed that Gee had gone on to say that medicine might in the future become an experimental science.

It is fair to say that this very happy gathering was infected with the happy personality of its distinguished Chairman, and the occasion was an exceedingly pleasant one.

Dark Blue Dinner

The Annual Dinner of the Oxford-Bart's Club was held at the Royal College of Surgeons, Lincoln's Inn Fields, on Tuesday, 12th March. Vice-Admiral Sir Alexander Ingleby-Mackenzie, K.B.E., C.B., was in the Chair.

The dinner was convivial and the speeches of a delightfully high standard. Dr. Norman

F. Smith proposed Oxford and Bart's, and wondered whether it was technically correct to join them with a hyphen ; if so, perhaps a more suitable title might be Oxford-siphon-Bart's. Distilling the wisdom of his experience, he recommended to the younger members that unless one is a vet. or a paediatrician it is best to take the history oneself.

Dr. R. Bodley Scott proposed the Club, and soon found himself referring to its illustrious president, the " doctor-sailor-brewer." With great courage (as the target of his remarks was next on the list of speakers) he quoted the remark of Dr. Johnson, that the only man who becomes a sailor is the man who has not the contrivance to get into a jail ; and that the sailor is the jailbird who runs the risk of being drowned.

Sir Alexander replied and used his guns sparingly. After amusing the company with one or two anecdotes, he spoke of his guest, Admiral Mayes, who is succeeding him as Director of Medical Services to the Navy ; of his long and happy association with the club ; and of Professor K. J. Franklin, to whom at the Annual General Meeting immediately preceding the dinner he had relinquished the Presidency.

New Hospitaller

The Reverend H. A. Norton was formally inducted as Hospitaller at a ceremony on April 12th. Mr. Norton has spent some time in Queensland, Australia, and has recently been Rural Dean of Market Harborough.

Redecoration of Cloakroom

Tentative plans have now been made for the redecoration of the students' cloakroom. Individual lockers will replace the present rows of pegs, and larger lockers will be provided for the use of clubs. There will be a drinking fountain, a drying bay, a ventilating system, and mod. cons. will replace the old and almost historical plumbing.

The repairs are expected to take about three months, during which time Mr. Garwood and his assistants are likely to become displaced persons, and the functions of the cloakroom will be dispersed over the hospital and parts of West Smithfield. The rooms under the Physiotherapy Department may be made available for leaving coats, etc. No doubt everyone will bear with these temporary inconveniences stoically in the knowledge that the old quarters will be returned to them in new and luxurious form.

The cost of the repairs, roughly estimated at £6,000, will be shared by the Medical College and the Hospital.

University of London

Professor J. L. D'Silva has been appointed a Fellow of King's College.

Oxford Entry

We welcome the following Oxford men who joined the Hospital in April :

J. M. H. Buckler (Brasenose).
C. W. Burke (Oriel).
R. L. W. Cleave (Magdalen).
J. M. Rice-Edwards (Wadham).

More About Percy

Our taciturn ambassador of goodwill has paid a state visit to yet another hospital. During the drawn Final against The London he was wrested from his supporters by force of numbers, and carried off in triumph to the barbarous lands of Whitechapel. There he stood like a primitive god watching over the savage celebrations of the evening.

However, little did this eastern tribe realise that two Bart's men were mingling with their number, nor that after the evening's mumbo-jumbo was over they helped the natives to carry Percy off to his dismal temple for the night. After lying low in the precincts for some time, they drugged the sleepy guards with the grape and brought our mascot secretly back to Bart's.

Now that we have entered Percy's close season, we trust that he will be allowed to recuperate in peace from the gruelling experiences of the past few months. We hope shortly to produce an authoritative History of Percy, and of course it is always possible that he will follow the fashion and write his memoirs for the Sunday Press.

Payment in Arrears ?

Banking circles are alarmed at a recent circular letter sent to parents by a public school, stating that increased overheads had forced them to alter their fees " from £300 per annum to £350 per anum." One startled parent shared their feelings, and replied that he would much prefer to go on paying in the old way, through the nose.

Advice from a Wise Man

There are probably few readers who will find completely redundant the following advice on general reading, which Sir Norman Moore gave to Dr. Ivor J. Davies. Dr. Davies was closely associated with Sir Norman Moore during his Bart's days, and writes that he used to marvel at his erudition. We thank Dr. Davies for sending the letter, which he has presented to the Library.

March 28th, 1912.
94, Gloucester Place,
Portman Square, W.

Dear Davies,

Sydenham was asked by Sir Richard Blackmore what book he would recommend him to improve him in medicine and replied "Don Quixote." It has often been quoted as an answer showing contempt for Blackmore but I do not agree with this view of Sydenham's advice. I think he meant "read a book which will give you a broad view of human nature" and the advice was good. So read Don Quixote and the best translations are those of Jervas and of Ormsby. Jervas is in excellent English, Ormsby is a more exact version and also in pure English. All the other English translations are less worth reading than these.

Then I advise you to read Boswell's Life of Johnson so as to know it well and generally to read all the great works of English literature. The whole of Shakespeare: Burke's Speeches at Bristol and on Economical Reform and on Fox's East India Bill and his letter to the Duke of Bedford: Goldsmith's Poems and the Citizen of the World and the Vicar of Wakefield: and Cowper's letters and Gray's letters and Swift's Journal to Stella and as much in the Spectator, the Tatler and the Rambler as interests you.

When you have read these you will feel how much good literature tends to improve a man as a physician: to fill his mind, train his thoughts and give strength to his judgement. With very kind regards.

Yours sincerely,
Norman Moore.

Sir Norman Moore entered Bart's as a student in 1869 and was a Physician to the Hospital from 1902 to 1911. He was a man of wide interests and great learning, and well qualified to give advice on reading to the aspiring doctor. Perhaps his main interest apart from Medicine was in all things Irish, and he occasionally used to break into the Irish language in the middle of a speech. An excellent account of his life by M. J. Linnett won the Wix prize in 1947 and was subsequently published in the *Journal*.

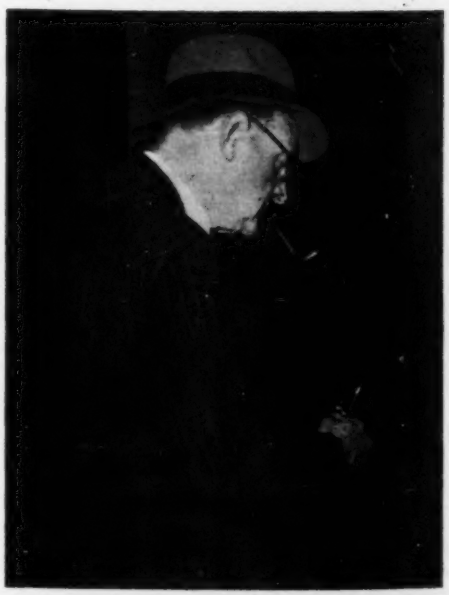
As a comparison, here is William Osler's recommended bed-side library for medical students:

1. Old and New Testament.
2. Shakespeare.
3. Montaigne.
4. Plutarch's Lives.
5. Marcus Aurelius.
6. Epictetus.
7. Religio Medici.
8. Don Quixote.
9. Emerson.
10. Oliver Wendell Holmes' Breakfast-Table Series.

What more can one say?

A recent poster advertised an Abernethian Society debate on the motion, "This house considers that too much attention is given to organised games by hospitals." Across it was written in large letters, "POSTPONED: RUGGER CUP REPLAY."

CANDID CAMERA



After the party?

ANNOUNCEMENTS

Marriages

CAIRNS—CRIDLAN.—On January 19th, 1957, David A. O. Cairns to Valerie Ann Cridlan.

ELLISON—BATES.—The marriage took place at St. Anne's Church, Highgate, on Saturday, 30th March of Antony John Hubert, elder son of the late Dr. H. H. L. Ellison and of Mrs. Bentley, and Margaret Heather, younger daughter of the late Mr. and Mrs. B. A. Bates of Huddersfield.

MCKINNA—PEARCE.—On February 16th, 1957, Dr. Alan McKinna to Marilyn Pearce.

Births

ELMHIRST.—On March 6th, 1957, to Sheila, wife of Edward Elmhirst, twin sons.

SIMS.—On February 26th, 1957, to Nancy, wife of Capt. A. J.Sims, R.A.M.C., a son (Stephen Jonathan Turner).

STONE.—On February 16th, 1057, to Ellen, wife of Patrick Herbert Dillon Stone, Swift Current, Sask., Canada, a son (Patrick).

WALSH.—On March 14th, 1957, to Anne, wife of Rodney Walsh, a daughter.

Deaths

GRACE.—In 1957, J. J. Grace, aged 85. (In California, U.S.A.) Qualified 1894.

HUDSON.—On March 31st, 1957. Bernard Hudson. Qualified 1903.

PERRAM.—On February 8th, 1957, Charles Herbert Perram, aged 90. Qualified 1893.

TAUNTON.—On March 18th, 1957, T. J. Taunton. Qualified 1915.

NOTICES

Oxford Bart's Club

The Oxford-Bart's club will be holding its Annual sherry party on the evening of Wednesday, June 2th at Dr. Strauss' rooms, 45, Wimpole Street. Anyone with the necessary qualifications who has not received an invitation is requested to contact the Hon. Secretary, Abernethian Room, St. Bartholomew's Hospital.

Twelfth Decennial (1925-1935)

The Annual Dinner of the Twelfth Decennial Club is to be held at the Naval and Military Club, 94, Piccadilly, W.1, on Friday, the 17th May.

Will any Member who does not receive notification, or any eligible non-Member who would like to attend the Dinner, please get in touch with W. D. Coltart, at 58, Harley House, N.W.1.

Contributions

The June *Journal* will be a special number devoted largely to the life and works of William Harvey, and will have gone to press before this *Journal* is published. Contributions for the July *Journal* should reach the Editor before the 1st of June.

Nurses' Representative

The nurses' representative, Miss Muriel Parker, has resigned from the Publications Committee and the post has therefore fallen vacant. The Editor would be grateful to hear from any nurses who feel that they would like to take on this useful and not too arduous task.

CALENDAR

Sat. May	11	Dr. G. Bourne and Mr. J. B. Hume on duty. Anaesthetist: Mr. F. T. Evans. Cricket: v. RAMC Crookham (H).
Sun. „	12	Cricket: v. Hampstead (A).
Wed. „	15	Athletics: v. Westminster Bank and Surrey A.C. (A). Golf: v. The Staff at Denham.
Sat. „	18	Dr. A. W. Spence and Mr. C. Naunton Morgan on duty. Anaesthetist: Mr. R. A. Bowen.
Sun. „	19	Cricket: v. Romany (H).
Wed. „	22	Athletics: v. Charing Cross Hosp. (H). Golf: v. St. Thomas's at West Hill.
Sat. „	25	Dr. R. Bodley Scott and Mr. R. S. Corbett on duty. Anaesthetist: Mr. R. W. Ballantine. Cricket: v. Balliol College (A).
Sun. „	26	Cricket: v. Radcliffe Infirmary (A). Golf: v. Tandridge G.C.
Wed. „	29	Athletics: v. Guys and London (H). Hospital Regatta begins.
Sat. June	1	Dr. E. R. Cullinan and Mr. J. P. Hosford on duty. Anaesthetist: Mr. C. E. Langton Hewer.
Tues. „	4	Athletics: v. Harrow School and Scarabs (A).
Wed. „	5	Athletics: v. Dulwich College and St. Mary's Hosp. (A).
Sat. „	8	Medical and Surgical Professorial Units on duty. Anaesthetist: Mr. G. H. Ellis. Sailing: First heats of Sherren Cup.
Mon. „	10	Sailing: Final of Sherren Cup.

LETTERS TO THE EDITOR

FRIEDRICH AUGUST KEKULE

Sir,—About eight years ago I was reading an article[1] on Iatrochemists, written by Dr. Trevor I. Williams, when I came across the interesting statement that Friedrich August Kekulé "was for a time a lecturer in chemistry at St. Bartholomew's Hospital, London," and I have always intended to pursue further this story of the connection between our Hospital and one of the greatest organic chemists of the 19th century (and possibly of all time). Recently I had an opportunity of learning more about the origin of this statement and I am very grateful to Dr. Williams, Editor of "Endeavour," for the information that details appear in Richard Anschütz's big biography on Kekulé. It appears that in 1853 John Stenhouse, then Professor in St. Bartholomew's Hospital, wrote to Liebig asking him if he could recommend two assistants. Leibig did so, sending Kekulé and Heinrich Buff.

Kekulé (1829-1896), besides being a very great chemist was also a very interesting individual. Some of his fundamental ideas about molecular structure were undoubtedly developed during the period when he was in London, for some of his ideas about the quadrivalency of carbon and the linking of carbon atoms came to him one summer afternoon when he was dreaming during his journey home across London as an 'outside' passenger on a horse omnibus. In his dreams, carbon atoms joined together and ultimately formed chains, all the groups "whirling in a giddy dance." The cry of "Clapham Road" awakened him from his dream.

In another dream, this time as he dozed by his fireside in Ghent, one of the twisting snake-like chains of carbon atoms seized its own tail, forming a ring structure; this idea was the foundation of Kekulé's concept of the benzene ring of six carbon atoms arranged to form a regular hexagon.

Certainly, Kekulé was a dreamer, but he was not content with dreams. "Let us learn to dream, to dream, gentlemen," he said, "and then perhaps we shall learn truth." Realising that visions are often baseless fabrics, he added with true scientific caution "let us beware of publishing our dreams before they have been put to the proof by the waking understanding."[2]

I hope that we can persuade our librarian, Mr. Thornton, or the Hospital Archivists, to search the Hospital Archives for details about Kekulé's work in our Hospital.

Yours truly,

A. WORMALL.

Dept. of Chemistry and Biochemistry,
The Medical College of St. Bartholomew's Hospital,
Charterhouse Square, E.C.1.

References:

[1] "Some medical contributors to chemistry," by Trevor I. Williams, *Brit. Med. Bull*, 1948, *5*, 369.

[2] Quoted from "A Direct Entry to Organic Chemistry," by John Read; 1948. Methuen & Co.; London.

Sir,—As I have recently investigated the Hospital Journals, abstracting material of specific interest to the College, I can supply certain information on those holding the position of Lecturer in Chemistry here. They were William Thomas Brande, 1836-1841; Thomas Griffiths, 1836-1851; John Stenhouse, 1851-1857; Edward Frankland, 1857-1864; and William Odling, 1863-1868. (Where these dates overlap it is because the post was held jointly.)

It would appear from Professor Wormall's letter that John Stenhouse (1809-1880) wrote to Liebig (under whom he had studied at Giessen from 1837-39) asking if he could recommend two assistants. These would not have been employed by the Hospital, and there is therefore no mention of their names in the official records.

If Kekulé came to Bart's it was as a personal assistant to Stenhouse. There is a similar situation at a later date when a Lecturer in Chemistry (W. J. Russell [1830-190?]) employed two demonstrators, one to assist with the teaching and the other as a research assistant. It would indeed be a great honour to prove that Kekulé was associated in any way with Bart's but there is nothing in the official records to throw light on the matter. Possibly letters of Kekulé or Stenhouse would prove that the former at one time worked here, and an investigation from that angle might prove fruitful.

Yours truly,

JOHN L. THORNTON,
Librarian.

Medical College Library.

PRACTICE IN CANADA

Sir,—I read with great interest Dr. Roberts' article in the February edition of the *Journal*. Readers may remember that exactly four years ago you were good enough to publish an article of mine in which I described the steps which brought me to Canada, in my case, Alberta instead of Saskatchewan. I therefore read Dr. Roberts' remarks with more than usual interest, and I am availing myself of your request for further articles on the same subject to comment on and elaborate a bit on some of the points raised by Dr. Roberts.

Practice in the prairies is particularly attractive to the British, for we do not need to pass the L.M.C.C. examination in order to practice in Alberta or Saskatchewan. In consequence, there are a large number of British graduates now in practice here. Of around 1,300 doctors now in practice in Alberta, around 17% are British trained. As far as I have been able to find out, five of these are Bart's men. A large number of doctors are listed as having specialist diplomas of one sort or another, the latest list I have shews 317 in all, of whom about 24% are general surgeons, 17% specialist physicians (referred to across the Atlantic as Internists) 12% are Eye and/or ENT men and 10% are O. & G. As Dr. Roberts has pointed out, a number of these are not consultants in the British sense. A man,

having got his specialist diploma, announces that he is opening an office where his practice will be limited to a stated speciality. He may list this speciality against his name in the Phone book and will usually see anyone who knocks at his door, but, if the patient's complaint does not fall within the bounds of his speciality, he is not meant to treat him. In fact, except when he has to admit him to hospital (where, in the larger cities strict rules keep the doctor in the right groove) this ethical point is often overlooked. As Dr. Roberts pointed out, this is due to the fierce competition. This is probably no worse than obtained in England in the old days, but, in the bigger cities, is certainly severe. This applies particularly to the General Surgeons and the Internists, and is due to the fact that the bigger cities are over-doctored. For instance Calgary (1956 figures) with a population of 155,000 had 245 doctors, or one per 630 persons. In Calgary there are 19 general surgeons and 13 internists while Edmonton, where the medical school is, has 36 general surgeons and 31 internists with a population (1956) of 214,000 and a total of 272 doctors. It will be seen from this that the aspiring Englishman is up against stiff opposition in the cities. What then is he to do to get himself established? In whatever field of work he prefers, if he comes in and squats he is going to suffer some lean years, except in vacant rural practices, just as our fathers did in the years before national health, and our immigrant Briton is prevented by the Bank of England from bringing with him the wherewithal to sustain himself over this period, always supposing that he has the necessary in the first place. He should, therefore, have some secure spot where he can be sure of not starving while he learns the local ropes and looks round for a good spot to start up in on his own. Dr. Roberts chose to take an intern post, and I think, and he admits it, that he was unfortunate. The Canadian system, after the equivalent of the first M.B., gives the student two, preclinical and two clinical years and then he takes his M.D. but after that there comes the most important part, the intern year, wherein is crowded all the practical work which his British confrere has had scattered over his three clinical years. At the end of this year he takes the L.M.C.C. (Licence of the Medical Council of Canada) without which he cannot work and which allows him to practice in any province. It will be seen from this that it may not be a very good idea for our immigrant to take a junior rotating post as he may find, as did Dr. Roberts, that the work is too junior for him. Better it would be for him to seek a post in a hospital which takes senior interns. There are not too many such. In Alberta, only the University and the Royal Alexandra Hospital in Edmonton (both teaching hospitals) and the Colonel Belcher in Calgary take senior men. However, in the hospitals which do not take senior interns, there are often not too many junior interns to make their work menial, for instance the Misericordia and General Hospitals in Edmonton with 308 and 383 beds have 3 and 4 interns respectively, while the Holy Cross and the General Hospital in Calgary with 400 and 626 beds have 8 and 10 interns respectively. The proportion of men to beds in these hospitals is thus much as one would find them in an English County Hospital, the only difference being a much greater staff, for no Canadian Doctor would consider himself properly treated if he could not treat his own patients in hospital. So our immigrant, then, if he chooses to intern, should try for a senior post, or else stick to the smaller hospitals.

The second alternative is to try and get an assistantship. These are fairly easy to come by, and many young men start off this way. Most principles pay $400—$500 per month, provide your own car (easily done as any Doctors' credit is good) but car running expenses are usually provided. Even if one has specialist training, these routes are still useful, but there is a third one and that is in group practice. The trend to group (or "clinic") practice is a growing one, especially in the middle sized towns, where it is often possible to form large partnerships whereby the terrors of competition can be avoided, men with specialist training be given scope to work, a roster of night call duty can be arranged, and the practice of medicine made altogether better. Such a group may advertise from time to time in the medical press asking for a man with some particular experience, and it was by this route that I arrived in Drumheller. If one joins such a group, it does not behove one to be too particular about one's speciality, for, as indicated above, there are not too many men anywhere in the province in general medicine or general surgery who wholly confine their efforts to their chosen fields. So it is that I, though I do the majority of the surgery for the eight men practicing in this hospital district (seven of whom are in our clinic) do have to do my turn of general practice, night work, and so on. It has done me such a lot of good that I now firmly believe that the Royal Colleges ought to insist that any man aspiring to a Fellowship or Membership should give evidence of having done at least one year in general practice. Likewise, I firmly believe, from the experience of my Canadian practice, that the Medical profession in England should insist on a fundamental right of every doctor to treat his own patients in hospital. Any abuses by poorly trained men trying to do more than they are capable of doing can be checked by the system of limiting privileges which is in general use in the larger hospitals hereabouts. At the same time, there would be no need for the large number of junior hospital staff posts, many of whose holders now so often face, after acquiring some special skill, no hope of ever being able to reach consultant status and so be able to put their knowledge to use profitably. If the Canadian system were adopted, then all the talent acquired by British G.P.s during their days as housemen or registrars which is now being wasted could be put to use. No wonder, as Dr. Roberts remarks, that the Canadian Doctor seems so incredibly good. It's not that he is better trained, or that he is a better man, it is just that under the British system a lot of what he learns in Hospital the G.P. will never be able to use in Practice, whereas his Canadian brother will. There is no doubt in my mind which system results in the better medicine for all concerned. I, like Dr. Roberts, could never practice in England again.

I am, Sir, Yours most truly,

A. J. WALKER.

376, Centre Street,
Drumheller,
Alberta.

PRACTICE IN SOUTH AFRICA

Sir,—Dr. Roberts' article in the *Journal* last month has prompted me to write and tell you of my own experiences and observations of practice in South Africa.

Having been born and brought up in South Africa, I was keen to go out and see for myself the state of the country after an absence of eleven years, and whether it would be worth settling there. After I had done two years on the house, I set sail with my wife and three young children . . . the youngest, three months, and landed in the Union with no job, but at least a home to go to.

First a word about registration. The Registering body is the South African Medical and Dental Council. They will recognise all English Qualifications, but require written evidence that the applicant has done at least two house jobs. There is a registration fee of fifteen pounds, and an annual fee of three pounds for all who wish to remain on the register.

I soon obtained a locum after arrival through one of the agencies, and found myself in a small country town in the Free State. This was a single handed practice, the gross income of which was about six thousand pounds. It was a mixed practice, meaning that the patients were English speaking, Afrikaans speaking and African. The Surgery was open from nine until five with a short break for lunch, and I found that there was a continual stream of patients coming in all the time. There was very little visiting and that was mostly done in the evening, and consisted of journeys of up to thirty miles out into the Veld. The standard of medicine here was high in the European practice, but very low on the African side . . . . this was mainly a cursory examination of the chest or abdomen (both with Stethoscope) and a bottle of Mist. Ammon. Chlor. or Mist Pot Cit. For this service the patient was obliged to pay seven and six in cash, which he willingly did. If Penicillin or tabs Sulpha were necessury a further seven and six was charged. I found that I was taking about twelve pounds a day in cash.

The European practice was a different type altogether. A full examination was made on every patient, including urinalysis, and frequently chest X-rays on the small but efficient machine in the Surgery. All drugs were supplied by the doctor. The standard fee for the consultation was two guineas with the cost of the drugs on top of that.

During my month in the practice I was able to do quite a lot . . . three normal deliveries, a forceps delivery a D and C, two Colles, a Potts, various minor surgical operations, including the extraction of about forty teeth under local anaesthesia, several severe Pneumonias, mostly among the Africans and some Psychotherapy conducted in my very scanty Afrikaans!

The second locum I did was down in a native reserve area in the Transkei. This was even more primitive. The practice was ninety-nine percent African and consequently all cash . . . about four thousand a year. The Surgery was open from nine until twelve in which time I saw up to forty patients. In the afternoon my small Austin was loaded up with a crate of bottles containing the stock mixtures, a twenty gallon drum of water and the Coloured interpreter and off we set into the bush. We drove out about thirty miles to the first of the out stations. Here I would see patients in a school, an unused garage, the Verandah of an Hotel, or even in the open air. This was a very social occasion, and there was always lots of advice and encouragement from the onlookers. Having seen fifteen to twenty patients at the first stop, we would load up the car again and move on to the next place. Four stations were visited each afternoon, and about a hundred miles travelled. Two weeks of this was as much as I could stand. In that time I saw three young men with massive pleural effusions, two open ulcerating Neoplasms, a Leprosy, unconfirmed, a retained Placenta, retained incidentally for three days before medical aid was sought, a stab wound in the chest and of course the usual number of Pneumonias and a mass of malnutrition.

After looking at several other practices I took a job as Casualty Registrar at the big Hospital in Durban. This was a very good job and I saw a lot of interesting cases. As Casualty Registrar I was able to order any investigation I liked in the Hospital . . . Barium meals for example . . . and carry out any minor operation. There was very little supervision and the hours were not exhausting . . . eight thirty until four with no night work and no weekend duty.

During my stay in Durban, I got to know several of the G.Ps. and was able to assess the kind of practice in the town. I formed the opinion that there were three types of practice. Firstly, the really high class practice, usually with three principals who qualified in England, and one of whom had his Membership. It is virtually impossible to get into this type. Secondly, the average mixed practice where the medicine was none too ethical and the size of the patient's bank account was more important than the severity of his disease. Lastly the African and Indian practice which was nothing but a money-making racket.

It did not take me long to realise that I would far rather be in England practising in the N.H.S. I would like to add, however, that I found this a most enthralling year, and I thoroughly recommend this way of life to anyone wanting to see a lot of South Africa.

Yours sincerely,

H. F. COWPER JOHNSON.

Peggs' Close,
Sheringham,
Norfolk.

VALGUS, VARUS & VAPOURS

Sir,—I hold no brief for the classical education, but I don't think that Mr. Plumptre's Latin has been altogether wasted. It is only by having some members as well informed in that subject as he is that our profession can have even an inkling that there may be anything unsatisfactory about *valgus* and *varus* being used to describe knees. Of course, there are many other irritations, which vary with a combination of one's pedantry and knowledge of Latin and Greek. Mine are relatively few, but can anyone make me daily happy by finding a suitable adjective to replace *homonymous*? I have not been able to discover how it acquired its special meaning in relation to the visual fields, but wonder whether the better, but still incompletely

adequate word, *homologous* was originally meant. And surely *stereoagnosia* sounds nicer, and is better than *astereognosis?*

It is true that *a, ab, absque, coram, de* hold little in store for the future doctor, but, out of fairness to the Rev. Prof. Kennedy, Mr. Plumptre might have recalled the preceding page of The Shorter Latin Primer. How about those medical masculines in " . . . . *fons* and *mons* (sic), *chalybs, hydrops, gryps* and *pons,"?* Also on the same page are: *fornix, calix, vas (vasis), dens, incus, sal, ren* and *splen.*

Furthermore, with a little Latin in mind, someone should have stopped the word concensus (sic) appearing in Miss Coltart's admirable little piece. (A pretty bit of etymology here, incidentally.) I too have the same fun as Miss Coltart when reading novels. Isn't Jane Austen exasperatingly vague? It would, of course, be too much to expect her to tell us about the state of Marianne's bowels, when that poor, wronged girl is so ill in Sense and Sensibility, but she tells us so little about anything else. It is only the agility in prognosis of Mr. Harris, the attending apothecary, that brings interest to this unsatisfactory case of P.U.O.; it helps us not at all to know that he "had pronounced her disorder to have a putrid tendency." Contrast all this with the pithy brilliance of the anonymous ballad writer: we have only to know that sweet Molly Malone died of a 'faver' while selling cockles and mussels (alive! alive! oh!, mark you!) in Dublin to be able to diagnose typhoid fever instantly.

Finally, I must protest to Miss Coltart at her description of Bexley (where I used to live) as "a filthy hole." Perhaps you have by now also had a letter from the Town Clerk. Bexley is certainly not what it was, but what it was was unquestionably a delightful Kentish village in the early days of chloroform and Charlotte M. Yonge.

Yours &c.,

JOHN POTTER.

3, Lorne Street,
Manchester, 13.

STUDENTS' UNION

There was a meeting of the Students' Union Council on Wednesday, 20th February. The following business was discussed:—

1. MODERNISATION OF THE CLOAKROOM.

This work is to be undertaken during the Summer Term. As it was not possible to obtain exclusive rights for the use of the Public Lavatories in Smithfield, the S.U. agreed to do without lavatory accommodation during the period in question.

The telephones are to be moved to the back of the cloakroom, and the rented boxes now in use dispensed with. New boxes will be provided as part of the re-decoration.

2. COLLEGE ADVISORS.

No further information was available regarding this problem which was due for consideration by the College Committee.

3. COLLEGE HALL.

The Dean was unable to accept the Council's proposal that more final year students should be allowed to live in College Hall. The present system which gives preference to first year students is to continue for a trial period.

4. CHARTERHOUSE LIBRARY.

The Council decided to ask for an extension of the Librarian's hours, so that the Library would be open from 10 a.m.—6 p.m. on weekdays, and 9.30 a.m.—12 on Saturdays.

5. JOURNAL OFFICE.

The present position of the Journal desk in the Library is considerel inconvenient, and an effort is to be made to incorporate a Journal Office in the rear of the re-styled cloakroom.

6. POT POURRI REPORT.

The report was read and approved. Due to the increased cost of this production, the prices of tickets next year will be increased to 3s., 4s., 6s. and 7s. 6d.

7. FINANCE REPORT.

The report was read and approved. The following points arose:

(*a*) A grant of £40 for new shirts was made to the Rugby Club.

(*b*) The sum of £15 13s. 6d.was granted to the Dramatic Society for new curtains and lighting equipment.

(*c*) A grant of £20 was made to the Sailing Club for new sails.

(*d*) The Rahere Music Society were asked to present a detailed estimate of the income and expenditure involved in the production of their Concert in the Church of St. Bartholomew the Great, before the S.U. can consider underwriting the venture.

8. FRESHERS' HANDBOOK.

It was suggested that the S.U. should produce a handbook giving details of hospital departments, Union activities, and other information helpful to the freshman. The proposers were asked to prepare a synopsis for Council's approval.

9. Permission was granted to the Boat Club to hold a Derby Draw.

10. THE ROCK AND ROLL CLUB.

This newly formed club was granted permission to use the gymnasium for a trial period of one month.

11. GRAMOPHONE ROOM.

Recent damage to the radiogram was considered to be due to the fact that the room was being used for purposes other than listening to records.

This matter was placed on the Agenda of the next meeting. Meanwhile it was decided that the room must be kept locked, and the key only obtained from the Hall porter on the production of a record library membership card.

THE MUSCLES OF OWEN

by A. J. E. CAVE

THE purpose of this trivial notice is merely to direct attention to two small muscles, and those non-human, which were the minor and incidental discoveries of that monumental figure in comparative anatomy and palaeontology — Sir Richard Owen. Even to mention such minutiae in the light of Owen's prodigious and profound contribution to zoological science is flagrantly antithetical: yet such mention in these pages may be excused on two grounds, the one domestic, the other educative. Owen was a Bart's man, and its greatest scientific alumnus: to the generations which succeed him within the Hospital and Medical College, even his smallest anatomical discovery cannot fail to occasion pride and interest, and no apology is necessary in defence of a little family gossip. The moral pointed by his minor myological discoveries is salutory for all, whatever corner of the scientific or clinical field be tilled: it is the perennially valid counsel that careful observation, of whatever material, is always rewarding.

The finding of hitherto unknown muscular slips in an animal carcase may nowadays be considered no great matter and perhaps not even a 'scientific' business at all. But the exploring hand and the observant eye which noted these admitted trivialities were equally responsible, under exactly similar difficulties of operation, for no less momentous a discovery than that of the mammalian parathyroid glands[1]. This lesson should be pondered, the more so perhaps in these present days, when, in so many scientific disciplines, an essential but increasingly complex exploratory armamentarium threatens to mask the fundamental necessity for direct observation of whatever material be under study.

A. J. E. Cave, M.D., D.Sc.(Vict.), F.L.S., F.R.A.I. Professor of Anatomy, University of London (Bart's): Hunterian Trustee: Vice-President, Zoological Society: Demonstrator and Lecturer in Anatomy, University of Leeds, 1924-34: Senior Demonstrator of Anatomy, University College, London, 1934-35: Assistant Conservator of Museum (1935-46), Arnott Demonstrator (1936-46), Professor of Human & Comparative Anatomy (1941-46), Arris & Gale Lecturer (1932, 1941), Royal College of Surgeons.

Before describing the two small muscles which Owen discovered, some brief reference to his early days, and to his association with Bart's, may not be regarded as irrelevant.

After serving professional apprenticeships (1820-23) as was the old custom in medical education, Owen matriculated in 1824 at Edinburgh University, wherein he suffered the notoriously unprofitable lectures of Monro Tertius, but most fortunately came under the stimulating extra-mural influence of Dr. John Barclay, whose courses in practical anatomy he attended. Barclay made a great impression on young Owen, by whom henceforth he was held in the most affectionate regard. In April, 1825, Barclay persuaded Owen to migrate to London that he might study under John Abernethy at Bart's and to this end gave him a letter of introduction and recommendation. Abernethy greeted the young man in characteristically off-hand fashion, but invited him to breakfast, when, impressed equally by Barclay's testimonial and the obvious qualities of his guest, he appointed him forthwith prosector for his anatomical lectures. Thus began Owen's memorable and valued connexion with St. Bartholomew's Hospital and its Medical College.

In 1825 Owen was elected to membership of the Medical and Philosophical Society of St. Bartholomew's (now the Abernethian Society) and the following year read before it two papers, one entitled 'On encysted calculus of the urinary bladder', the other 'A case of gluteal aneurysm with ligature of the common iliac'. That same year he qualified M.R.C.S. (old style) and set up in medical practice among the lawyers of Lincoln's Inn Fields — more precisely, at 11 Cook's Court, Carey Street—almost next door to the Royal College of Surgeons Museum, wherein so much of his future professional life was to be spent. In 1827, doubtless through Abernethy's wisdom, he was appointed Assistant Conservator of the Hunterian Museum, William Clift being Conservator, and his son, William Home Clift, Assistant Conservator with the assured promise of succession to his father's office. The next year Owen became

Lecturer in Comparative Anatomy at Bart's, in which post he continued until 1835, establishing therein his great reputation as an impressive and successful lecturer. It would seem that for most of this period Owen lectured at the request of the Hospital Staff, for it was not until October, 1834, that he received formal appointment by the Hospital Governors. Howbeit, it is to the memory of this historic teaching association that the 'Owen Laboratory' is dedicated in the present Department of Zoology and Comparative Anatomy of the Medical College in Charterhouse Square.

About this time Owen inaugurated his long-sustained and meticulous anatomisation of animals dying in the menagerie of the Zoological Society of London (of which he was Fellow by 1830 and Council Member by 1834), thereby laying the foundations of his exhaustive and unrivalled knowledge of vertebrate morphology. (The minor myological discoveries detailed below were made in this connexion.)

But by 1832 Owen found himself in a quandary. His practice was small, his work at the Royal College of Surgeons and at Bart's was not very remunerative, the succession to the Conservatorship of the Hunterian Museum was promised to young Clift, and Owen himself, engaged to Caroline Clift, was anxious to marry. He had published that year his classic 'Memoir on the Pearly Nautilus', which established his reputation as a first-rank scientist both at home and abroad. Yet nowhere appeared any channel of permanent employment congenial to his bent and affording scope to his distinctive and undoubted talents.

This dilemma, however, was unexpectedly and tragically solved by the accidental death in the September of William Home Clift. Sustaining a fractured skull from a cab accident in Chancery Lane, he was admitted to St. Bartholomew's Hospital (being received by Owen) and died therein some days later. By this stroke of fate William Clift lost a son and gained a son-in-law, and Owen's professional life settled into its predestined course, first at the Hunterian, later at the British, Museum.

Inevitably, a full-time Assistant Conservatorship of the Hunterian Museum necessitated the severance of formal academic ties with Bart's. Henceforth, Owen's labours were to be directed wholly away from medicine and into those fields of comparative anatomy and palaeontology wherein John Hunter had pioneered. But private ties continued to bind Owen to his old Hospital and Medical College, and many of his erstwhile colleagues and students remained his life friends. Nor did he ever forget John Abernethy, who had sat at Hunter's feet and whose devotion to his master's ideals secured for the Hunterian Museum the services of his former prosector, the one man then capable of organising and developing its collections.

Hunter-Abernethy-Owen : Hunter-Clift-Owen. In double measure the Hunterian tradition devolved upon the receptive Owen, whose native genius, thus fortified and stimulated, rendered him the greatest of a distinguished line of Hunterian Conservators and the one perhaps most sympathetic to Hunter's distinctive outlook on biology.

That story, however, is outside our present purpose, and we return to Owen's anatomical labours in the Prosectorium of the Zoological Society. Here a prodigious amount of hard work was achieved upon a wide variety of comparative subjects, and over the years there issued in consequence a voluminous output of memoirs and papers whose classic importance time has not diminished. Perhaps only personal experience of the dissection of large mammals can bring realisation of some of the difficulties involved — the laborious business of flaying and dismemberment, the unwieldy nature of parts and organs, the impracticability of employing preservative injections and the inevitable race against the onset of putrefaction. Under such conditions, and anatomising such desperately awkward carcases as those of rhinoceros and elephant, the discovery of even insignificant muscles is both a tribute to acuity of observation and an object lesson in prosection.

M. depressor palpebrae inferioris.

(Owen, *Trans.Zool.Soc.*, 1852, *4* (Art. 3), 55)

Commenting on the structure and mobility of the lower eyelid, Owen[2] remarks that 'rarely in mammals has it a proper depressor'. He himself was the first to observe such a special depressor muscle, and this during his dissection of a male Great Indian Rhinoceros (*Rhinoceros unicornis*) which he anatomised

during the winter of 1849-50. His specimen was the first example of this species to be acquired by the Zoological Society of London, in whose menagerie it lived from 1834 to 1849. Owen refers to the M. depressor palpebrae inferioris both in his classic monograph[3] on the Indian Rhinoceros and in his monumental treatise[2] on vertebrate anatomy and physiology.

It seems most unlikely that his muscle had been observed by Vicq d'Azyr and his colleagues, in their earlier (1793) dissection of a male Great Indian Rhinoceros in Paris. This animal (whose skeleton is now No. A7974, Mus.Nat.d'Hist.Nat., Paris) had lived for some twenty-one years in the Royal Menagerie at Versailles and was dissected in July, 1793, by Mertrud, Vicq d'Azyr and S. Rousseau. No published account of their work ever appeared, Vicq d'Azyr dying the next year; but thirty-four relevant folio plates, executed by Maréchal and by Redouté *père et fils*, and annotated in Vicq d'Azyr's hand, remain unpublished in the Muséum National d'Histoire Naturelle. One of these plates depicts the eyeball and its attached muscles but none of them concerns the eyelids and their musculature.

Unfortunately, Owen gave no details of the attachments and relations of his depressor muscle, contenting himself with the single statement[3] that 'the lower eyelid has a special depressor muscle', and subsequent authors have adopted a morphological rather than a physiological nomenclature for the various components of the mammalian facial musculature. It is therefore uncertain whether Owen's M. depressor palpebrae inferioris represents the M. preorbicularis ventralis or the pars palpebralis of M. sphincteris profundus of Boas and Paulli[4], but in either case it is clear that a special depressor fasciculus to the lower eyelid is not confined to the rhinoceros, for Virchow[5] has noted its presence in the elephant.

M. nictitator.

(Owen, *Comp.Anat.Phys.Vert.*, 1868, 3, 260)

In the elephant the nictitating membrane is supported by a special cartilage to assist its action as a cleanser of the surface of the eyeball. Owen observed[2] that 'there is a special "nictitator" muscle, the fibres of which pass at first over the base of the membrane in a curve, then form an angle to include the extremity of the nictitating cartilage, which is consequently moved in the diagonal of the contracting forces, and pushed forward and outward over the front of the eyeball'.

This 'nictitator' muscle consists essentially of slips which proceed from the deep aspect of M. orbicularis oculi to the upper and lower aspects of the 'handle' or posterior process of the cartilago nictitans. It recalls, but is not necessarily homologous with, the pars lacrimalis of M. orbicularis oculi in Man (= Horner's muscle, M. lacrimalis posterior, M. sacci lacrimalis, M. tensor tarsi). Innervation is similar but is here an uncertain guide, for in the elephant a lacrimal sac and nasolacrimal duct are wanting, and it needs yet to be established whether a cartilago nictitans is invariably provided with a M. nictitator, likewise the nature of anatomical arrangements in those species wherein a lacrimal sac and a nictitating cartilage coexist.

The elephant has attracted the attention of anatomists from antiquity, when both Aristotle and Galen made observations upon its structure: later dissectors of this animal, before Owen's day, include Moulin[6], Blair[7], Duverney and Perrault[8], Camper[9] and Hunter[10], but none of these appears to have anticipated Owen in his notice of the M. nictitator. The presence of this muscle has been subsequently confirmed by Virchow[5] who, however, appears curiously silent as to Owen's previous finding.

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ASPECTS OF COLONIAL MEDICINE

by UNA MALCOLM KING

SHE CHOSE the day on which we started to pack up the house, before our return to England, to fall off the bus. Daydream is our coloured cook. She is, by the way, a first-class cook. She hobbled back from the doctor with her ankle bandaged, and said that the doctor told her she must go to the Hospital to have her leg X-rayed the next day. We drove her home, home being a small wooden house precariously propped up from the ground with small stones balanced on larger ones. Her mother, 80 years old, and her daughter lived with her.

In the evening of the next day the daughter came to see us. Mother, she said, had been X-rayed and there was a 'large gap in the bone'; she knew because she had seen the picture herself. They had put mother to bed with her leg in plaster and told her that it was fractured, and that she must keep the leg up. We expressed our regrets.

The following day I rang "Hospital, Enquiries, Patients." After much explanation of name and ward and a very long wait, the answer was "All the patients in all the wards is much better this morning." But to our utter astonishment the daughter appeared that night and said that the Hospital had sent mother home, because each bed must hold two patients and Daydream was too big to share a bed with anyone else. Incidentally she is 6 foot tall and 56 inches round the hips—so that was understandable.

A week went by, in which we missed the delicious soufflés she excelled at, before Daydream came walking up the drive with her knee bandaged. We were very surprised. "I go now to see the doctor up the road, I do not like the Hospital." "Do you know what a fracture is?" I asked. "No please" said Daydream. "Is this bandage what you call a plaster?" I asked, for daylight was dawning on me. "Yes please, they tell me I slip the biscuit in my knee."

"Daydream" I said "when you see the doctor ask him to send me a message as to what *is* the matter with your leg." She came back later with her *ankle* bandaged and said "The doctor he say I have a 'lame' leg and you spell it L.A.M.E."

* * *

Our barber, who is a fisherman by trade, does not believe in doctors at all and he, also, has no use for the Hospital. For months now he has had a bandaged finger, which makes hair cutting both difficult for him and hazardous for us. On being asked what was the matter with it he said that he had cut a large fish hook out of it with his penknife. Weeks passed by. The finger was still bandaged and the hand very swollen. "Not healed yet?" we asked. "There is still a lot of muck in it", he replied, "It hurts all up the arm, so I cut it again with my penknife. I have done it several times; it will be alright once I get it all out". We suggested going to a doctor. "Oh, no", he said, scornfully, "I do it as good as the doctor". "But", we exclaimed, "your penknife is dirty, full of germs". He was furious at this remark and said, as he produced the knife from a dirty pocket. "Look, you call that dirty?" It certainly was shining bright. The finger is still bandaged.

Some authorities in this tropical island are trying to stop the enormous birth rate by teaching "Birth Control". Since the Church does not approve, it is called "Family Planning". Our laundry maid, who is 23 years old, has her own idea of "Family Planning". She was gradually increasing in size. I asked her if she was going to have a baby. "Oh, yes, please", came the reply. "Are you married?" I asked. "No, please". "Is this your first baby?" "No, please, I have four boys". After the first shock of this answer, I said "Is the same man the father of them all?" "Oh, no . . . if you put your foot in an ants' nest, how do you know which ant bit you?" she replied with a kind of pitying look for my stupidity.

But that they *are* trying to improve conditions there is no doubt, for only the other morning I read in the island paper the following caption: "MR. KIDNEY OPENS PUBLIC LATRINE". Underneath was a large picture of Mr. Kidney christening a "stand" in truly noble fashion. This, of course, is a well meant effort to do away with notices so nicely put by the French, "Defense d'uriner". It seems a shame that poor Mr. Kidney's example will not be lived up to.

THE MEDICAL STUDENT AND RESEARCH

by J. T. SILVERSTONE

PART I: PAST ACHIEVEMENTS

IT WAS NOT until the sixteenth century that the scientific beliefs of Roger Bacon, which had filtered down from the Middle Ages, were finally crystalized into firm convictions in the minds of most men of learning. Before the Renaissance, although many accurate observations had been made in medicine, no systematic investigation had been attempted. But in the late 1500's throughout Europe and especially in Italy, the medical sciences were swept by a wave of enthusiasm for knowledge. Many students, motivated by the desire for learning, flocked to the great centres of Padua and Bologna where they could witness such innovators as Vesalius perform dissections on human bodies. These students, influenced by what they had seen, returned to their own cities eager to discover more about the structure and function of man in health and disease.

Great changes were also being made in medical education, changes which were reflected in the growing participation of medical students in all fields of biological research. As the old system was dissolving a knowledge of Greek became less necessary; a more naturalistic tendency began to appear in the curriculum. Zoology became a recognised subject for study by medical students, and botanical gardens were set up in many places of learning where students could observe the plants which provided many of the remedies they would use in practice.

It was in such an environment that Valerius Cordus (1515-44) the son of a physician and botanist, discovered sulphuric ether while a student. He spent his years of training at many universities as was the fashion of the time, beginning at Wittenburg and going on to Padua, Bologna, Ferrara and Venice. He, the first of the famous student investigators, went on to make great contributions in the field of botany.

By the beginning of the seventeenth century, scientific investigations were so widespread that historians have dubbed this 'the age of experiment'. Advances in anatomy continued to be made, these being assisted by Leeuwenhoek's development of the microscope.

The lymphatic circulation was investigated in more detail, and several students made valuable contributions in this field. Jean Pecquet (1622-74) a student of the University of Montpelier, discovered the thoracic duct and receptaculum chylae during a dissection of a dog. He traced the chyle, not to the liver as expected, but to the receptaculum via the lacteals and from there to the thoracic duct which he found entering the left subclavian vein. This discovery was confirmed by another student, Olaf Rudbeck (1630-1702) who was studying at Leyden in 1651. The valves in the lymphatics were first noticed by Jan Swammerdam (1637-80). This anatomist was fortunate in being reared in a scientific atmosphere; his father had the finest collection of exotic fauna in his native city of Amsterdam. In fact, the young Swammerdam became expert in microscopic dissection before he commenced his medical studies. and before he qualified in 1667 he had made two further important contributions. He described the red blood corpuscles in a frog fourteen years before Leeuwenhoek mentioned these cells, and he observed the fact that foetal lungs do not float unless the infant has respired, a finding which is used in forensic medical practice to this day. Again in Holland, a Danish student, Niels Stensen (1638-86) discovered the parotid duct in a sheep.

The current doctrine of embryology was 'Omne vivum ex ovo', but in 1674 a medical student, Johann Hamen, made the first observation leading to the downfall of this theory, by his discovery of spermatozoa, which he pointed out to Leeuwenhoek.

In the eighteenth century the teaching of medical subjects improved markedly. In England tuition could be obtained at London, Edinburgh, Aberdeen and Dublin, and seven London hospitals were open to students. Those wishing to be physicians had to undergo a much longer training than aspiring surgeons. The latter were only required to attend a course of lectures before

Prizewinning essay in the B.M.A. competition, 1957. (Abridged.).

presenting themselves for an examination by the Corporation of Surgeons or the Worshipful Society of Apothecaries. The physician was obliged to obtain a degree from a University plus a licentiate from the Royal College of Physicians, and was expected to 'be familiar with the principles of medicine and exhibit some general erudition and culture'. The union of a university with a hospital took place at Edinburgh in 1738, and another innovation, that of combining the students of surgery and medicine, occurred at the Military Medical School in Vienna in 1785.

One of the great figures of the century was Thomas Young (1773-1829) who was such a prodigy that he was referred to as 'phenomenal' Young. While a student at Bart's he was dissecting an eye from a recently killed ox when he noticed that mechanical stimulation of the ciliary muscle caused alteration in shape of the lens. He later read a paper to the Royal Society demonstrating that the accommodation of the eye for different distances is due to a change in curvature of the lens, for which he was elected a Fellow at the age of 21.

Another who has left his mark in medical history and who made astute observations during his medical training was René-Théophile-Hyacinthe Laennec (1781-1826). He gave the first adequate description of peritonitis and mitral valvular disease. He also discovered the subdeltoid bursa while studying in Paris at the Charité under Corvisart, and he recognised the true aetiology of hydatid cysts. To crown his student achievements he gave a lecture in 1804, the year of his qualification, in which he stated that phthisis was a tuberculous condition of the lungs.

Sir Humphry Davy (1778-1829), who was apprenticed to a surgeon apothecary and associated with the Medical Pneumatic Institute of Bristol, can be considered the founder of anaesthetics. He demonstrated that nitrous oxide was respirable and could produce great exhilaration. He remarked in 1799, 'as nitrous oxide in extensive operation appears capable of destroying pain, it may probably be used with advantage during surgical operations in which no great effusion of blood takes place'.

As Davy was to anaesthetics, so Edward Jenner (1749-1823) was to preventative medicine. His contribution on this subject is world famous, and it was during his apprenticeship to a surgeon near Bristol that he first conceived the notion that it would be worth while investigating the immunity from small pox in those who had cowpox. When discussing the idea with Hunter, under whom he later studied, Jenner was told, 'Don't think, try; be patient, be accurate' — a good introduction to research.

The nineteenth century saw a turning away from the metaphysical doctrines of the preceding age, and a turning towards an objective approach to science. Biology advanced concurrently with physics and chemistry, and a mechanistic viewpoint obtained in all fields of Natural History. Of the many discoveries which altered men's attitudes in biology the following appear some of the more significant: the recognition of the cellular nature of living organisms; the law of conservation of energy; the appreciation of the bacterial cause of infectious diseases; the theory of evolution put forward by Darwin and the genetic investigation of Mendel.

France led the medical world in the early part of the century, but with the growth of experimental laboratories in Germany more students crossed the Rhine to study under eminent German professors. In England the Medical Act of 1858 regularised the obtaining of licences to practice, a privilege which had often been obtainable previously by purchase alone. A commission on medical education sat in 1881 to advise on a medical curriculum and the training of students. Gradually, during these hundred years, the system as it appears in the present day was evolved. More opportunity was given to the student to perform class experiments, thus acquainting him with much of the scientific apparatus of the time. That this knowledge was put to excellent use the quality of student research will testify.

The 'father of experimental medicine', Claude Bernard (1813-78), made original discoveries during his period of study at Paris. Although he did not publish any works before he qualified, he had completed several experiments. He was stimulated by seeing a case of facial nerve palsy to trace the course of the chorda tympani nerve, while in his thesis he described his observation that the injection of cane sugar into a vein is followed by the appearance of sugar in the urine, but no urinary sugar appears if the injected sugar is previously treated with gastric juice.

The nervous system began to attract a great deal of interest and during the nine-

teenth century teaching in the subject was considerably affected by the work of Ramon y Cajal, Sherrington and Charcot. Students also contributed to the knowledge of neuro-anatomy, neuro-physiology and neuropathology. Herman von Helmholtz (1821-94), who came under the influence of Johannes Müller at Berlin, was able to discover the origin of nerve fibres from cells in the ganglia of leeches and crabs using only a rudimentary microscope. Robert Remak (1815-65), another protegé of Johannes Müller, was the first to describe non-medullated nerve fibres. By the time he graduated from Berlin he had shown that the axis cylinder is the transmitting part of the nerve trunk ; confirmed in vertebrates that nerve fibres originate from cells ; and demonstrated ganglion cells in the walls of the heart and intestine.

The name of Freud is universally associated with psycho-analysis but he commenced his work on the nervous system, while a medical student, with the study of its development and phylogeny. He described the derivation of the T-shaped dorsal root ganglion cells of the spinal cord, and gave an account of the phylogenetic levels in the development of the central nervous systems. He also made observations on the neurofibrillary structure of axons in the water-crab, and on the tracts and nuclei within the medulla oblongata.

Two eminent neurophysiologists, Sir Henry Head and Sir Charles Sherrington, began their research while students. Head wrote a paper on the action potentials of nerve in 1886 and later began his classic work on the rôle of the vagus nerve in respiration. Sherrington, while a Cambridge undergraduate, studied the effects of hemisection of the spinal cord in a dog and of the removal of the cerebral hemispheres.

Neuropathological knowledge was advancing, partly as a result of undergraduate endeavours. Marc Dax at Montpellier described the correlation between aphasia and lesions of the dominant cerebral hemisphere. Edward Brissaud (1852-1909) pointed out the relationship of pontine lesions to varying degrees of hemiplegia. Constantin Monakow (1853-1930) made good use of the opportunity he was given for studying brains at autopsy while a student of Hitzig at Zurich by describing the histological changes occurring in some cases of organic dementia. Franz Nissl (1860-1919) won a prize from the University of Munich for his thesis on the pathological changes of the nerve cells in the cerebral cortex.

The vascular system became the special interest of several student investigators. Jean-Leonard Marie (1799-1869) was able to measure the blood pressure in an artery by using a mercury manometer which was connected to the artery by a hollow lead tip filled with potassium carbonate to prevent clotting. This work was followed up by Rudolph Magnus (1873-1927) who measured the blood pressure in exposed arteries.

The movement of red blood corpuscles out of the capillaries was studied in a preparation of living frog's tongue by Augustus Volney Waller (1816-1870). F. M. Landis while a student in the 1920's, perfected a technique for measuring the pressure within the capillary vessels, and with this was able to verify Starling's hypothesis.

Digestion was rapidly becoming more fully understood. Ivan Pavlov, who later used digestive reflexes to study the higher nervous activity, began his work with experiments on the nervous control of pancreatic secretion. He was so well thought of that he was put in charge of a laboratory before he was qualified. Walter Bradford Cannon (1871-1945) was led to try and observe the movements of the stomach in intact subjects after overhearing a conversation about ' the new rays '. He started with buttons as a contrast medium but later developed the technique of using bismuth, and it was these student experiments that led to his later publication of 'The Mechanical Factors of Digestion '.

Two important principles of pharmacology were first expressed by medical students in the nineteenth century. James Blake (1815-93) who later was known as ' Gold Rush Doc ' in the gold fields of California, read a paper before the British Association for the Advancement of Science when he was a student at the University College, London. He expressed the idea that the effects of drugs on the body was determined by their chemical structures. This principle remains sound although he believed that monovalent elements acted on the lungs, divalent elements on the heart, and those with higher valencies on the nervous system. Paul Ehrlich (1854-1915) became interested in lead poisoning during his training at Strasbourg, and developed a fuschin stain to demonstrate lead in the tissues. This experiment is said to have convinced Ehrlich that certain tissues have a

selective affinity for certain chemicals.

With the growth of tropical medicine parasitology became widely studied, and two students have left well-known contributions to the subject. Sir James Paget (1814-99) during his first year's dissection at Bart's noticed some small white specks in a muscle which he examined under a microscope. These consisted of a small worm surrounded by a capsule and were identified as Trichinella spiralis, previously unknown to be a human parasite. Much interest was being taken in the aetiology of malaria, and Sir Ronald Ross had almost solved the problem. He was at an impasse however, until the work of a student at Johns Hopkins, William George MacCullum (1874-1944) led to the discovery that the so-called flagella of Plasmodium were in fact sexual forms.

It is the science of anaesthetics which owes most to student work. The discovery of ether by Cordus and the experiments on nitrous oxide by Davy have already been mentioned. In the middle of the nineteenth century three American students started the use of anaesthetics in surgery. William E. Clark at Berkshire Medical College was in the fashionable habit of holding ether entertainments. With the experience thus gained he was able to administer ether to a dental patient — the first recorded use of ether anaesthesia. Crawford W. Long also learned from ether entertainments held while he was studying at the University of Pennsylvania. After these parties he noticed he often had bruises, almost certainly the result of injuries he failed to perceive at the time. After qualifying he used ether in a surgical operation. William Thomas Green Morton (1819-68) was a dentist before taking up the study of medicine, and he had heard of the anaesthetic effects of nitrous oxide. While at Harvard Medical School he experimented with inhalation anaesthesia on puppies and a dental patient. He finally persuaded the chief surgeon at the Massachusetts General Hospital to use it for an operation, when it succeeded in preventing the patient from feeling any pain at all.

From the student endeavours of the past many an illuminating fact or theory has emerged. Often the early research led to a life-long interest in experiment to the great benefit of the world at large. As Fulton says, '. . . simple facts were once hidden in a fog of faulty observation and faulty reasoning and it was sometimes the enquiring minds of students that made matters clear'.

PART II: PRESENT OPPORTUNITIES

One of the most pronounced features of recent years has been the general increased interest in scientific research. This has led to a greater number of opportunities becoming available to the medical student who wishes to undertake a research project, opportunities in a wide variety of subjects.

During their preclinical studies most students in England are taught by those personally engaged in research, who will often welcome a junior assistant. Usually the members of the various departments are willing to help any student seeking an introduction to experimental method. At Oxford and Cambridge there is perhaps greater opportunity than elsewhere for this type of relationship to develop, because each student has individual teaching sessions with a tutor. Such a tutorial system has led in many instances to the pupil becoming associated with a facet of his tutor's research. The long vacations provide ample time for the undergraduate to pursue an interest under expert guidance without curtailing his studies, or his leisure.

During the time the student is learning clinical medicine his opportunities for research are curtailed. One reason is that clinical research does not lend itself to student participation, for without a sound knowledge of clinical methods and a wide experience it is impossible to assess any patient satisfactorily. Another reason is that the vacations are much shorter and the student is strenuously urged to relax completely during his holidays. But there do remain some opportunities for student investigation.

A study of clinical notes which are open for perusal by students, may lead to the appreciation of previously unrecognised factors in disease. In this way Stewart and de Winser were able to determine the relative importance of the various factors concerned

in the perforation of peptic ulcers. Some teaching hospitals provide an incentive for this type of research in the form of an annual prize for the best report of cases seen at these hospitals during a given year.

Another opportunity open to those with an inventive turn of mind is in the design of apparatus. A striking example of a student's success in this field is the pneumatic respirator developed by the Clitheroe medical student L. P. Grime, which was reported in January of this year.

With such a wealth of opportunity and excellence of example, it is disappointing that more present-day medical students remain unaffected by any wish to undertake a scientific investigation.

This absence of enthusiasm is partly due to the attitude of the hospital and medical school authorities, an attitude which is illustrated by a quotation from Professor Ian Aird's report of the B.M.A. subcommittee studying the proceedings of the First World Conference on Medical Education. He states, 'It is the general view in England that the undergraduate student should not be active in research . . .' Most students are thus discouraged, and the officials of at least one London teaching hospital consider that there is not enough time for a conscientious student to indulge in any extra-curricular activity other than recreational.

It is difficult to reconcile the above with the following recommendation of the Royal College of Physicians' Committee on Medical Teaching: 'the aim in future should be to give the student a basic professional education of high standard . . . much may be gained by arranging for the student to spend some months wholly or mainly in any department chosen by himself, both his interest and his understanding will be stimulated by working in an atmosphere of progress and research'.

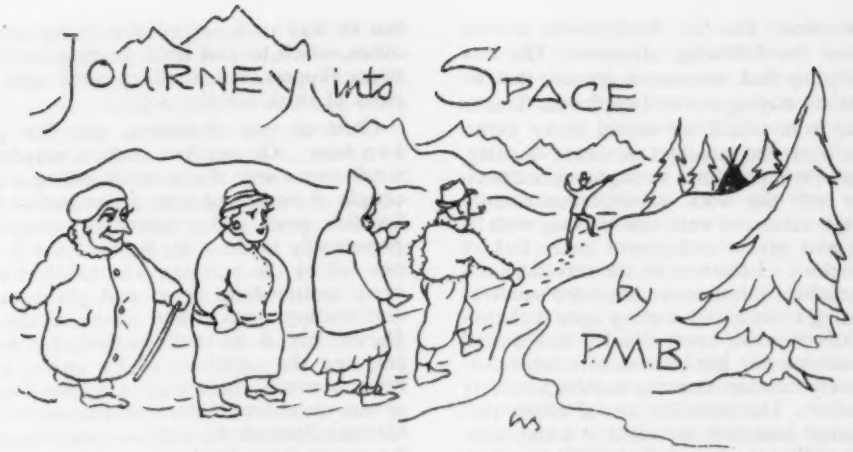
Many American students, on the other hand, are given every encouragement to attempt the investigation of a scientific problem. Yale University as long ago as 1917 began the experiment of allowing students a great deal of freedom in their curriculum, and providing opportunities for research. The University of Pennsylvania students' magazine publicises student efforts in this direction by printing a list of projects undertaken by students. At the University of California at Los Angeles many students take part in research programmes during their summer vacation. They are paid for doing this out of University and Federal funds thereby ensuring that they spend their time more profitably than their fellows who seek employment in the more mundane occupations of dishwashing and waiting at table.

While not advocating such changes in this country it would seem that more incentive could be provided for students to learn something of the rewards and difficulties of scientific experiments. Personal encouragement is a matter for individual teachers and students, but might be assisted if the student had a clearer understanding of scientific method, which could be obtained by a series of introductory lectures on the subject, as suggested by Professor Bradford Hill.

Lack of time is an excuse rather than an obstacle. Compared with his American colleague the English student has a great deal of free time even after reasonable periods for relaxation are deducted.

There is a greater difficulty over financing the student's research programme and in providing monetary rewards, if such are thought to be desirable. A survey of the B.M.A. Book of Medical Scholarships reveals that each year every hospital and university provides considerable sums in prizes for students who pass competitive examinations in each subject. Instead of fostering individual enquiry these tend to promote reading of small print and obscure papers about uncommon diseases. If such money were used to provide incentives for original observation many more students might engage in this truly educational pursuit.

This plea for more interest by the authorities has been succinctly expressed by Dr. William Gibson. 'Good seed can be helped greatly by good soil. The determining factors have often been the provision of facilities for a student investigation by a sympathetic teacher. The lesson for us today would be clear. Summer research scholarships in all fields of medicine and its ancillary sciences are likely to repay us handsomely as educators. Encouragement of original work by undergraduates is in the best tradition . . . and offers one method of offsetting the homogenizing influence of too many specialist boards. Student curiosity can be depended on to bring to light new facts of major importance, as it has in the past. The shaping of the conditions under which students will work and grow is a major challenge to all educated people'.



STOCKHOLM was on the brink of a major Trade Fair and a European Heart Conference, so of course taxis were at a premium. Our train for Lapland left at 4 p.m. and we felt quite sure that it would go without us, but by dint of vast patience, extravagant arm-waving and a large slice of luck, a taxi with an illuminated LEDIG sign drew in to the kerb, and we had met and conquered our first obstacle. The station was a seething mass of people—residents, tourists, trade delegates, and an extraordinary number of physicians from the most unlikely countries. We tracked down our platform at last, and found a motley crowd of cardiologists surrounded by mounds of luggage, and a small neat woman guide in the uniform of the Swedish tourist agency which had organised this pre-conference trip to the Arctic Circle. With enviable efficiency and an amazing command of most of the European languages, she shepherded her protégés towards their train, and in the minimum of time we found ourselves in a minute, but beautifully equipped sleeper.

The journey started without undue incident, and the hours of early evening slipped away while we watched, entranced, the Swedish countryside, lit by the sunset, unfolding beyond the dusty windows of the train. We had spent an intriguing half-hour exploring our compartment which the Swedes, with their passion for mechanical contrivances, seemed to have fitted with an incredible quantity of buttons, levers, and other more complicated gadgets, and we had discovered, to my chagrin, that the exciting-looking door which appeared to lead at the very least to a private bathroom, was thoroughly locked. This was borne out when the occupants of the next sleeper in their turn tried to force it open, and we found that it was in fact nothing more than a communicating door between the two. We enjoyed, a little later, an excellent dinner in the restaurant car—a meal which was enlivened by the appearance on the menu of reindeer steak, and by the delight with which the small Swedish girl opposite us achieved, in a burst of unsuspected erudition, an English 'Thank you.' After dinner we settled down in our compartment with our staple holiday reading, a couple of thrillers, but life was not to be without its own small excitements. At intervals the door into the corridor opened abruptly and heads poked themselves in to announce the sale of magazines, or tobacco, or, for all we knew to the contrary, merely to bid us good-night. This habit of walking in unannounced, though pleasantly companionable, had its hazards when the time came to get ready for bed, and it was a considerable relief to find that there was actually a lock we could use. G. turned it, and for a while all was peace. I had just got myself into a nightgown, not entirely Victorian in character, and was sitting on the edge of the bunk, brushing my hair, when an ominous clicking sounded from the corridor and I found myself facing the unembarrassed stare of a large man in official uniform. He said something politely but quite uselessly, and disappeared whence he came, leaving G. and me in a state of mingled consternation and giggles.

We were due at Riksgränsen around tea-time the following afternoon. The tour programme had announced grandly that we would be staying at the Lapplandia Tourist Hotel, from which we would make excursions, and the prospect sounded inviting, though perhaps a little incongruous in association with the wild, mountainous country through which we were now passing, with its lakes and peaks, and almost entire lack of civilisation. I think, with the traveller's unquenchable optimism, we imagined suddenly rounding a bend and coming upon a charming little Swedish town, situated in beautiful unspoilt country, but oh most certainly boasting every comfort that the twentieth century can offer. The actuality was of course that we found ourselves deposited at a tiny wayside station, with untrammelled nature spreading in every direction, the only apologetic gesture that humanity had made being the railway line, a ski-lift, and a group of wooden houses that resolved themselves, upon closer inspection, into the Lapplandia Tourist Hotel—and as we left the train, it started to snow! In actual fact the Lapplandia was a ski-lodge, and an extremely comfortable one, with central heating, excellent food, and the most delightful staff that one could imagine, and having said good-bye to our visions of a smaller edition of the Grand in Stockholm, we did not regret them once — but we were a little disconcerted by the surrounding countryside. The lovely view from our windows of the deep, placid lake, the snow-clad peaks, and the unspoilt stretch of richly glowing tundra was well enough, and indeed we praised it to the skies from the aesthetic point of view, but exploring it was another matter. Not one of the party, some forty strong, seemed to have conceived of the possibility of there not being such a simple amenity as a road, and it came as something of a shock to find that the much-vaunted excursions were not of the motor-coach, or even of the boat, variety, but on our own feet. The women, particularly, had no footwear suitable for trudging through snow-covered heath, and worse. But a little matter of that kind was of small consequence. The Lapplandia staff came to the rescue in no uncertain manner and by the first morning, every cardiologist and cardiologist's wife, was equipped with something that would do at a pinch — and in some cases, did just that! I was lucky enough to get stout walking shoes that fitted perfectly, but G. had to be satisfied with zip-up goloshes, which he first tried wearing over bedroom slippers, but finally padded with two pairs of thick woollen socks.

Chief of our excursions was the great Lap hunt. On our first walk, a nonchalant stroll over a sort of goat-track lasting a mere couple of hours, we were accompanied by a Swedish guide and a bounding Alsatian — presumably to do a St. Bernard act if anyone fell by the wayside. The guide stopped every quarter-mile or so and gazed at the surrounding peaks like stout Cortez in Darien, but as he spoke nothing but Swedish, and the members of his party could raise between them only English, French, it was some time before we discovered that German, Spanish, Portuguese and Egyptian, he was looking for Laps to show us. It is a curious fact that, like flowers in an English garden when one visits it, one never seems to go to a place at the right time to see its chief attraction, unless of course it happens to be something immovable, like St. Paul's, and so it was with us and the Laps. Almost all we knew about Lapland before we visited it was that it was famous for the Midnight Sun, reindeer and Laps. We were, inevitably, out of season for the Midnight Sun. The reindeer which apparently had appeared in scores to those at the front of the train, had all taken fright and disappeared by the time our rear coach arrived on the spot — and now there was not a Lap in sight. Our poor conscientious Swedish courier, who had promised us Laps, like lollipops to children on a school treat, was deeply concerned, and in a fashion that seemed to us nothing short of miraculous, finally discovered that A Lap Family was still in the vicinity. The method she used involved complicated telephone conversations, but as telephoning a Lap encampment seemed about as fantastic as ringing up a Hottentot village, we forbore to go into the matter further. Enough that the Laps were there, and that we were to walk out and see them, reindeer skin tent, traditional costume, and all. The distance, we were told, was a mere four kilometres following a short train ride, and having hurriedly sat down and computed what that meant in mileage, we decided it was worth it.

We set out, accordingly, all forty of us, arrayed in a variety of garments that for piquancy and colour would have put any Lap to shame — it was cold enough to need

plenty of clothing, but heavy overcoats would have been a disadvantage when walking, and the problem was solved with duffle coats, windbreakers, mackintoshes, and every kind of woolly. I worked out my own salvation by wearing G's pyjama coat under my sweater. The odd couple of feet which had to be turned up at sleeves and waist practically gave me another layer. In due course, we arrived at the end of the rail journey and, marshalled by our two guides, who were heavily laden with luncheon packs, we set out across the tundra, like a pale imitation of the Great Trek. The first stop came quickly and abruptly. We drew up in a group inside a large stockade, and were informed impressively that this was where the reindeer were corralled and branded. Naturally at another time of the year! We gazed round obediently for what seemed like about twenty minutes, but without discovering any new fact about the stockade, and then away we went again. This time there was no stopping. The path, if one might dignify it by such a name, led away from the railway line, across marshland, over rocky outcrops, down greasy slopes, over perilously balanced duckboards which as likely as not, acted as a seesaw and plunged one into muddy swamp. Here and there a red mark on a boulder suggested the way, but for the most part one trusted in Providence and the guides. The views all the way were magnificent, provided there was time to look at them, and one was not busy with one's feet. After the first few miles the party had divided into three — an energetic vanguard, who had obviously spent all their lives trekking across the wide open spaces in their various homelands, an American couple and ourselves in the middle, acting as a link, and a large and weary group coming on behind in a sort of pilgrim's progress, groping and stumbling and picking themselves up again. The hills stretched away interminably ahead, and the path to the Laps apparently did too. Breakfast was a long way behind, and lunch seemed destined to be far in the future. Now and then we had a moment of bafflement when the party in front seemed to have been swallowed up by the ground, but patient tracking of footprints would bring us up with them again, and finally, rounding a shoulder of rock, we came upon them all on the shore of a river. This had to be crossed in two leaky boats which could only carry about five at a time, and it was a hazardous process, to say the least. One of the boats had literally to be emptied after each crossing, and both needed constant baling while in mid-stream. However, to my permanent surprise, we all got over safely, and embarked upon the next part of our travels. Equally surprisingly, for we had now got used to the idea of walking for ever, this was a comparatively short stretch, and there at last was the Lap tent. Not exactly a thing of beauty, perhaps, but one cannot have everything, and it was picturesque in its way, with the flap open, a fire burning brightly inside, and a forest of little birch trees surrounding it cosily. The male Lap, the only one in evidence when we arrived, came entirely up to expectation with his brilliant costume of the traditional red and blue, and it was exciting to drink coffee made from his cheerfully hissing kettle, and to eat our long overdue lunch in the atmosphere of nomadic domesticity which surrounded the tent. Some washing hung on a roughly-made arrangement of birch logs, and we had not long to wait before the 'housewife' appeared with the rest of the family. There were 'oohs' and 'aahs' of admiration for her gaudy, embroidered dress, and the two children were surrounded in an instant. They too wore the red and blue garments that characterise the national costume, the baby boy's cap surmounted by an enormous scarlet pom-pom which made him look like some fantastic doll. Cameras clicked madly, coins changed hands, and the weary pilgrims relaxed comfortably in the knowledge that, at whatever cost, they had at last Seen The Laps. It was a pity that a few of the more enterprising spirits, looking for fresh fields to conquer, walked to the top of the slope overlooking the tent, and found on the other side, The House that the Laps Really Lived In, though disillusionment would inevitably have followed when something was produced from the depths of the tent and carefully handed round, and turned out, to our everlasting mortification and delight, to be a Visitors Book.

After this, the walk home could not fail to be a little of an anti-climax, particularly perhaps for a gallant Egyptian who suffered from arthritis and had spurred himself to the effort with an extra dose of cortisone. However, as someone remarked, it made an excellent exercise tolerance test for those cardiologists who believe in practising what they preach.

THE BIOLOGICAL MECHANISM OF X-RAYS

by D. F. PARSONS

RESEARCH INTO the various sensitivities of tumours to X-rays, the distribution of the dose of irradiation in the tissues, etc., has its obvious practical importance. The detailed biochemical and biophysical studies now being carried out in many centres, require more justification. It is that clinical radio-therapy is as much in need of basic metabolic investigations as is clinical chemotherapy in order to provide a rational background for future advances.

In the Physics department one of the radiobiological subjects now being investigated is the mechanism of action of X-rays on the important macro-molecules of the cell. The stimulus for this work was the introduction of a new and sensitive technique for detecting the broken chemical bonds and free radicals (highly reactive intermediate compounds containing an unpaired electron), called paramagnetic resonance spectroscopy. To Dr. P. Alexander of the Chester Beatty Institute and myself this seemed a promising method for investigating the effects of irradiation on biological substances especially since the available chemical methods are insensitive and can only detect changes on the exterior of giant molecules like nucleoprotein. The present preliminary work on model synthetic macromolecules and on natural nucleoprotein has shown that the method is superior in several respects to chemical methods. It is capable of giving a very rapid result ($\angle$ 10μsec.) and this is important in detecting the earliest changes produced by irradiation. Rapid measurements of this kind, of course, require that the dose of irradiation be also given very rapidly. The 15Mev. Linear Accelerator is unique in being able to do this since it can produce up to 10^4r. in about one millionth of a second. The output is pulsed (up to 500 pulses per second) so that measurements between pulses are possible.

Below, present ideas about the mechanism of action of radiation on cells are outlined and followed by a discussion of the results of the present investigation in relation to these ideas.

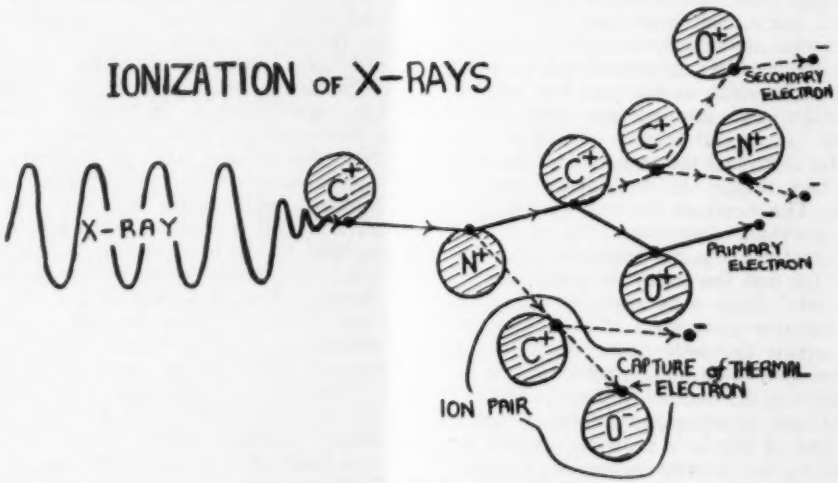


Figure 1.

IONIZATION OF X-RAYS

The biological effect of many kinds of radiation (x-rays, electrons or β-rays, γ-rays ($^4_2$He), protons ($^1_1$H, etc.) except neutrons are surprisingly similar. The reason is that the important effects are due to the secondary

electrons released by all these radiations. The initial stages of interaction of an x-ray with the atoms of a molecule are shown in Figure 1. There are three stages:

1. The x-ray causes ejection of a primary electron from an atom.

2. The primary electron interacts with other atoms giving rise to free radicals and secondary electrons.

3. Terminal interaction of electrons or free radicals with the " target molecules " in the cell.

Most of the energy is absorbed in the ejection of electrons from their orbits and the intensity of absorption depends on the atomic number of the atom concerned and the density of electrons in the material. In practice this means that the dose of x-rays is distributed similarly in water and simple organic substances to human tissues so that the measurement of dose distribution is greatly simplified.

In the therapeutically important megavoltage range of x-rays the transfer of energy to the ejected electron occurs mainly by the Compton effect in which the electron has any energy from nearly zero to that of the incident x-ray depending on the angle of the collision. If higher voltages (greater than 50 Mev.) come into general use such processes as electron-positron production and the induction of radio-activity in some atoms of the material, will be important. The secondary electrons shown in Figure 1 are produced, mainly, at the end of the track of the primary electron and this explains why modern megavoltage radiotherapy is so superior to lower voltage therapy. In this range the maximum dose and number of ionizations are produced not at the skin surface but some centimetres deep to it. Hence larger doses can be given with less skin damage. However, x-rays at this high voltage are only slightly absorbed by human tissues so that damage to posterior skin and structures may be extensive. Electrons at 15 Mev. approach the ideal since they show the same " build-up " of dose but a sharply limited range of about 7 cms. so that the exit dose is nearly zero.

Although qualitatively the effects of all ionizing radiation, except neutrons, are the same they differ quantitatively, in the number of ion pairs produced. Neutrons differ in first ejecting protons which then proceed to produce very heavy ionization by ejection of electrons. Neutrons are of interest therapeutically since the ejection of protons depend to some extent on chemical composition and so some degree of tissue selectivity may be possible. They can be produced with the linear accelerator by irradiating uranium with 15 Mev. x-rays.

Target Substances and Mechanisms of Ultimate Reactions.

(a) Characteristics of the direct and indirect mechanisms

There are two possible ways in which the free radicals and secondary (" thermal " or slow) electrons, produced as illustrated in Figure 1, may react with the " target " molecules in the cell.

In the *direct* mechanism a thermal (or a high velocity) electron interacts with an atom in the target substance causing ionization or excitation of the molecule with or without the breakage of chemical bonds.

In the *indirect* mechanism the target substance is attacked by free radicals produced by the ion pair. (See Figure 1).

In the indirect mechanism the free radicals are produced mainly from ionized water molecules because of the high affinity of oxygen for electrons—

$$H_2O + O_2 \xrightarrow{\text{x-rays}} HO^{\cdot} + HO^{\cdot}_2$$

The effect of x-rays on oxygen-free solutions is much less, and a decrease in the biological effect on removing oxygen is unambiguous evidence of an indirect reaction according to the above equation. If the biological effect is reduced on irradiating the frozen material the indirect mechanism is again supported since any free radicals produced would not be mobile.

Crowther, in 1924, suggested the target theory, (1) where all the biological effect was ascribed to a single ionization ocurring in a minimal sensitive volume of the cell. With many solids or solutions of viruses the calculated sensitive volume agrees so closely with the volume of the molecule, or the active part of it, that a direct mechanism must be assumed. Even at low dosage there are, probably, more than one target substance and much confusion has arisen from trying to ascribe all the biological effects to a single chemical change.

Remarkably small doses inhibit growth and mitoses in some cells, e.g., only 0.01r, inhibits the fungus *Phycomyces blakesleeanus*. Using the more usual dose of 34r.

for chick fibroblasts the number of molecules affected is about 68,000. This number is far too small for the target molecule to be one of the smaller, more numerous, molecules like ATP. Assuming, for example, the target to be desoxy ribosenucleic acid (DNA) of molecular weight 6 x 10^6 and an average content of 6$\mu\mu$G. per cell, there are about 600,000 molecules on the chromosomes, and assuming about 15,000 genes per cell there are only 40 molecules of DNA per gene. Hence if DNA is the target molecule, about 1,700 genes could be affected by 34r, leading to widespread genetic and melabolic disturbance.

(b) Biological effects of radiations.

Radiation produces the following effects in tissues : inhibition of growth and mitoses, mutations, chromosome aberrations, carcinogenesis, widespread metabolic disturbance and release of enzymes, and cell death. The dose (and dose rate) required to produce any of these effects is very different for different tissues and even isolated cells. The effects are not comparable in animals because they are considerably modified by variation in blood and oxygen supply, damage to capillary endothelium, lowered antibody response and endocrine imbalance. The variable sensitivity of cells is at least partly due to the presence of natural protecting substances which compete with the target molecules for the free radicals. Polyploidy and the dependance of cellular oxidation on cytochrome oxidase, (2) are also important factors.

Euler and Hahn (3) and also Duryee (4), isolated nuclei by micro-dissection and irradiated them separately in order to see if the cytoplasm was necessary to produce the observed chromosome changes. The isolated nuclei were very radio-resistant when judged by chromosome changes probably because no mitosis occurred subsequently to make the damage apparent. Zirkle and Bloom (5) ingeniously tried to settle the question of the site of the target substance by passing a fine beam (2.5μ) of protons separately through the nucleus and cytoplasm. Passage of only a few neutrons through the nucleus produced chromosome changes, but heavy doses to the cytoplasm produced no effect.

(c) Chromosome aberrations.

The main abnormalities are " stickiness ", breakage of chromosomes and chromatids, and errors in spindle formation. Broken chromosomes may rejoin leading to translocations. The site of breakage of the chromosome is randomly distributed and not localised to one part as with the mutagenic substances (including the nitrogen mustards). While x-rays break chromosomes by an indirect mechanism and have their maximum effect late in interphase, nitrogen mustard acts directly (when nucleic acid synthesis is at a maximum), at mid inter-phase. Hence these substances are wrongly labelled " radiomimetic " (as has been previously discussed (6)). While the chromosome aberrations produced by x-rays and nitrogen mustard (HN_2) are not related, their mutative effects do appear to be related. Strains of *B. coli*, which are resistant to x-rays are also resistant to HN_2 and *vice versa*.

(d) Effects on DNA and nucleoprotein.

Müller, 1927, showed that 3,000r. to the *Drosophila* fruitfly increased the natural mutation rate by one hundred times and serves to emphasise the action of x-rays on the nucleo-protein of the genes. It is a definite possibility that the ribonucleic acid (RNA) of the cytoplasm or molecules is also affected, but Forssberg and Klein (7) showed, using labelled orotic acid (a specific precursor of RNA) that RNA synthesis was unaffected by moderate doses of x-rays while DNA synthesis stopped with as little as 35r. *In vitro* experiments showed a large drop in molecular weight of DNA on irradiation in solution and Errera (8), demonstrated the same change *in vivo*.

Past work indicates that the effect of x-rays on nucleic acid is probably the most important event occurring on irradiating the cell. The nucleo-protein of the chromosomes is present as a concentrated gel (30%) so that it is possible and probable that the main reaction is a direct one. Some evidence of this is available in Ephrussi-Taylor's work on the inactivation of transforming principles (6, 9) and also in Pollard's studies of the inactivation of viruses. In this case the change of structure should be detectable on irradiating solid DNA or nucleoprotein, when only the direct reaction can occur. In fact, it is found that gross chemical change only occurs with large doses of radiation and this fact has led many to think that the direct mechanism is not important *in vivo*. The present work, using the new paramagnetic resonance technique, is aimed at demonstrating the fallacy of this argument. DNA is probably one of the most

structure sensitive of all biological molecules so that gross chemical change (the splitting off of amino- or phosphate groups, for example) are not required to destroy its biological activity. It is suggested that a few scattered broken bonds are sufficient, so that a proper test of the sensitivity of DNA to irradiation depends on the measurement of these and not of liberated chemical groups. The method of paramagnetic resonance spectroscopy has been found very suitable for this purpose.

The Paramagnetic Resonance Method and Results.

When a substance containing an odd electron (i.e., it is paramagnetic) is placed in a high frequency electromagnetic field (frequency vc/s), and a steady magnetic field applied (H gauss) at right angles to the magnetic component of the electromagnetic

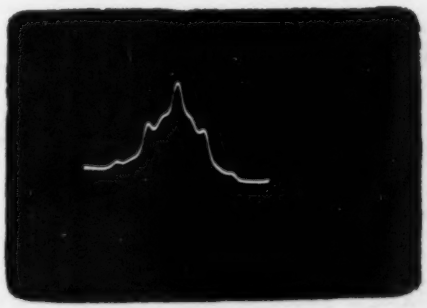


Figure 2. *Paramagnetic Absorption Spectrum due to Breakage of Carbon—carbon Bonds in Polymethyl-methacrylate.* (Dose 100,000r./G).

field, a strong absorption of energy occurs in the substance when the following quantum condition is satisfied:

$$h\nu = g\beta H$$

where h is Planck's constant, g the spectroscopic splitting factor, and β the Bohr magneton. The intensity of the absorption is proportional to the number of uncoupled electrons in unit volume. Instead of the single sharp peak predicted by the above equation a more complex spectrum is obtained, with multiple peaks, due to interaction of the uncoupled electron with a neighbouring nucleus. The number of these peaks and the shape of the spectrum allow the broken bond associated with the uncoupled electron to be identified. Hence this method allows the effect of irradiation to be exactly placed even in a large molecule. In practice the method is found to be very sensitive, since 10^{-9} moles, containing one broken bond, can be detected. The best results are obtained at very high (microwave) frequencies ($\nu = 10{,}000$ mc/s and $H = 3{,}500$ gauss). Technical details will not be discussed here, but the equipment, in most ways, follows conventional radar techniques. The spectrum of the broken bond is ultimately obtained directly on a cathode ray oscilloscope or, alternatively, on a pen-recorder. Figure 2 is a photograph of the spectrum of a broken carbon-carbon bond in synthetic polymethylmethacrylate polymer, produced by a dose of 100,000r. per gramme. The number of broken bonds is estimated by comparing the area under this curve with the area under the curve due to a known weight (a few μG.) of a solid free radical (α, α'—diphenyl picrylhydrazyl).

In order to record the immediate effects of irradiation on nucleo-protein and other macro-molecules, specimens have been irradiated and measured at liquid nitrogen temperature (-190°C.). By this means the first reaction of the thermal electron is stabilised and then, on slowly warming up, a series of chemical events can be watched and estimated. At this low temperature it was found that the complex spectra of nucleo-protein and polymethylmethacrylate resolved into a single peak 20 gauss wide indicating that the initial effect was not bond breakage but simple ionization and trapping of the ion pair in the solid. On warming up the ion pair recombined, some of the energy being utilised in breaking bonds. This was confirmed by the production of a blue-green phosphorescence on warming the specimen, and the variation of intensity with temperature showed that this effect was identical with the photo-luminescence observed in other materials and known to be due to recombination of an ion pair. Measurements of the number of broken bonds at different temperatures indicated that over half of the broken bonds initially formed recombined with corresponding modification of the structure. The energy required to produce the initial ionization was found to be only 30 ev. per ion pair, a value in agreement with the established value for ion pair production in

gases (32.5 ev.). Hence, far from the direct effect being unimportant in those macromolecules investigated, as appeared to be indicated by purely chemical investigation, this mechanism seems to be surprisingly efficient when judged in terms of ion pair production and broken bonds.

Future work is directed towards the measurement of bond breakage in 30% nucleo-protein gels in order to establish the nature of the bonds broken under these conditions. Some start can then be made towards explaining how these changes bring about the observed cytochemical effects of irradiation.

ACKNOWLEDGMENTS

It is a pleasure to acknowledge the advice and encouragement of Professor J. Rotblat and the collaboration of Dr. P. Alexander, of the Chester Beatty Institute, throughout these investigations.

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SPORTS NEWS

VIEWPOINT

Now that the winter is drawing to a close one looks back on the sporting activities with mixed feelings. The picture is of course dominated by the glorious failure of the rugby team in the Cup, and though it is tantalising to have been so close to renewing a long overdue supremacy, one may draw some consolation from the fact that the Cup now rests in Whitechapel and not in its perennial niche in Paddington. The Competition has been relieved of its monopoly, the critics have been confounded, and the rugby team was for two days in the limelight of the national Press.

All very gratifying — but in the weekly pilgrimages to Richmond the Ladies' Hockey team's winning of their Cup passed almost unnoticed. Indeed, some members of the hospital were only aware of their triumph when gathering in the square to watch the captain take her annual dousing. Other sections were less successful, but the Hockey Club deserve sympathy for failing to reach the final by the odd goal in seven.

So much in retrospect. Looking forward, it rests with the Cricket Club to continue the good work, and they are at least favoured with an advantageous draw. So who knows?

1st XV v. Aldershot Services **Won 9—6**

For the last match before the Hospitals Cup Final Bart's fielded all but one of their Final team. However whether it was because of the morning kick-off or whether because everyone was thinking of the Final the team made a very slow start, and never really got going. After 20 minutes the Services had scored a try and a penalty goal for a 6-0 lead. Before the interval M. J. A. Davies had reduced the lead with a penalty goal, and in the second half, with things going much more our way, Phillips equalised the scores with his first ever drop goal and five minutes from the end Davies kicked a very long penalty goal to give us a narrow victory.

HOSPITAL CUP FINAL

Bart's 9 pts., London Hospital 9 pts.

The preliminaries to a Hospital Cup Final are usually organised on a grand scale as befits the occasion, and this year's game played on the 20th March was no exception. Percy was accompanied from his secret hideout by a party of devoted Bart's supporters suitably attired, and armed with rotten fruit in order to withstand any assault. Alas, the London supporters outnumbered our stalwarts by five to one, and after a fierce battle

in which soot, red ochre, flour and rotten vegetables were thrown around with unabashed fury, Percy was captured and carried off by the foe. One ingenious defensive weapon used by the London to successfully repulse Bart's counter attacks, was a stirrup-pump which rained a veritable deluge of red ochre on would-be assailants until Richmond really looked like a battlefield. However, all was cleared by the time the teams ran on to the field looking fit and eager for the fray.

The London kicked off, and both teams used the touchline until a London three-quarter movement ended with a set scrum at half-way. Carr heeled against the loose-head, and the ball was passed quickly to Phillips who could not beat a good defence, and from the ensuing maul London were awarded a penalty, and a good touch was found. Phillips was again put away from a Bart's attacking movement, but was tackled into touch when gathering his kick ahead.

Following two penalties awarded to them, the London kept up sustained pressure in the Bart's 25 for the next 10 minutes, when Lammiman and R. R. Davies were prominent with good relieving kicks. The Bart's pack with Dobson in the van relieved pressure with a good rush, but were immediately sent back again following two more penalties against them, and only good covering by Howard Thomas and Tallack kept the line intact.

Breaking very fast from a scrum, Mackenzie tackled the opposing outside-half Lee in possession, and the Bart's pack dribbled the ball on. When stopped, a quick heel saw the ball reach the Bart's three-quarters but a misplaced grub-kick spoiled the movement. Then after 23 minutes play Bart's were awarded their first penalty, but M. J. A. Davies hit the cross-bar with a good kick. The London brought the ball into play immediately without touching down, and gained a great deal of ground down the left wing. They then launched a good three-quarter move from a line-out and their left-centre Colwell broke through before kicking high to the posts. Fortunately Phillips was on hand to save with a good touch. However, London soon took the lead when Lee kicked a good penalty after 25 minutes play.

There followed a period of indeterminate play between the two 25 lines, marked only by keen tackling on both sides, and a good piece of fielding by Badley of a difficult high punt, before London again scored in the 37th minute. The ball reached the right wing Hewett from an orthodox passing movement, and when hemmed in he cross-kicked towards the posts. The Bart's defence was shattered as Lee, coming up at tremendous speed, caught the ball on the burst and scored an excellent try which was not converted. In the remaining few minutes of this half Bart's attacked strongly, but when the whistle blew for half-time, the London undoubtedly deserved their 6 pts. lead.

Within 10 minutes of the restart Bart's had shot into the lead by virtue of some excellent all-round play, which must have been appreciated even by the most biased members of the crowd. First Halls carved out an opening in the centre and made ground before passing to Phillips who took his pass at full speed. With the cover defence converging rapidly, the full-back to beat, and 30 yards to run Phillips wasted no time, and scored a magnificent corner try after bursting through McEwan's tackle. This was wing three-quarter play at its best, with great determination and footballing ability allied to speed, as so rarely do wings possess all these attributes. Then following a good touch by Brian Richards into the London 25, the Bart's pack took control as they flattened the opposition with a tremendous rush — for Dobson to score in the left-hand corner. Neither of these tries was converted by M. J. A. Davies from very difficult positions, but not to be outdone he dropped a beautiful goal from 30 yards out, making it 9 - 6 to Bart's.

During this period Bart's really looked a Cup-winning side and while the London were still wondering what had hit them, Bart's kept up the offensive hemming them in their own 25. However, the London soon awakened from their reverie and proceeded to give blow for blow, but Phillips, Laurie Thomas and Roche did some good things to keep them at bay, until a skilful piece of rugby enabled them to draw level. A scrum formed 15 yards from the Bart's line, and the London heeled. The ball went to outside-half Lee, who caught the defence on the wrong foot by reversing a pass to centre Cumming who had run inside. He burst through a bewildered pack, for once caught off their guard, and passed to scrum-half Hopkinson on the line, for the latter to score. The conversion failed.

With 15 minutes left and the scores level, the stage was set for a grand finale, and the crowds of supporters were not disappointed. Both sides hammered into each other with great zest, although a certain weariness was detectable with the frequent kicks to touch. A kickable penalty to the London went begging, and both lines were frequently in danger from rampaging forwards following up opposition errors, but somehow or other there was no further score. The final whistle blew with both sides slogging it out in mid-field, and a replay became necessary. It was something of an anti-climax when such an enjoyable game ended to stalemate, as the crowd was certainly in the mood for a fight to the finish in extra time. Nevertheless a draw was a true reflection on the afternoon's play, which contained admirably conceived scores interspersed between good, clean, fast, open rugby.

Team : as in photograph.

REPLAY

Bart's 3 pts., London Hospital 5 pts.

This match, played on the 26th March, six days after the magnificent drawn game which necessitated the replay, was expected to be an anti-climax ; and so it was ! No one was inclined to indulge in pre-match festivity with all the involved preparations, and the only amusement enjoyed by the crowd was a somewhat short-lived tête-a-tête between a huge St. Bernard and a dog of lesser stature but of unimpeachable pedigree. Except on few occasions the game as a whole lacked the excitement and intense quality which marked the previous encounter, and the players seemed stale in comparison. Nevertheless the game had its moments of quite good rugby which must have pleased those present who were completely unbiased.

Bart's kicked off and McEwan caught the ball c'eanly to put it into touch. Then after R. R. Davies had put Bart's on the offensive by finding touch on the London 25, Halls was well tackled when trying to find an opening, and the London pack carried play into the Bart's half. The London three-quarters then handled well, but Phillips tackled Salter to halt the movement, and immediately after, they were held up again when Mackenzie caught Lee in possession.

After 20 minutes Bart's took play to the London line, when a good forward rush, with Dobson to the fore, took advantage of a dropped pass. Bart's heeled from a five-yard scrum, but M. J. A. Davies was literally collared trying to break through and London stormed back to half-way. Immediately following this Bart's had a golden opportunity to open the score when Mackenzie burst through and handed on to D. Richards. He in turn passed to Lammiman, but the wing was caught when a score seemed imminent. From then until the 34th minute the play fluctuated about mid-field, both sides trying to initiate scoring movements, but neither defence faltered until London conceded a penalty when M. J. A. Davies kicked a good goal. This infused new life into the Bart's team and they remained on the offensive until half-time when they crossed over with a well-deserved 3 points lead.

For the first 10 minutes of the second half Bart's continued to press, and when Mackenzie broke up a London passing movement M. J. A. Davies crossed the line only to be recalled for a forward pass. L. Thomas was prominent in the loose mauls, and from a good mark under pressure H. Thomas found an excellent touch. Gradually the London worked their way upfield and returned to the offensive, and a reverse pass from Lee to Salter looked dangerous until the latter ran into the covering forwards. A London kick-ahead bounced awkward'y for Badley but he managed to get the ball into touch on his own 25. It was from the ensuing line-out that London scored their try. The ball came back to Lee who attempted a drop at goal, but although it sailed across in front of the goal posts, an awkward high bounce caught the Bart's defence off-guard and Cumming caught the ball on the burst to score behind the posts. Lee was successful with the conversion and so the London led 5-3 with about 25 minutes play left.

Mackenzie continued to get the best out of his team and there was very little to choose between the two sides. Phillips, M. J. A. Davies, and Halls, well supported by the pack, made tremendous efforts to break through but the defence held firm, and indeed London put in just as many attacking movements. Halls in particular made one excellent run but spoilt it with a bad pass when a score seemed probable. The Bart's back-row forwards were frequently in the limelight both marauding and initiating attacking movements, while the front and second-rows gave nothing away in the set scrums. The last minute saw Bart's break away with Howard Thomas prominent, but the London held out to win an enjoyable game, and it is fair to say that the London always looked just capable of hanging on to their slender lead, although they could never afford to slacken their effort in face of continued Bart's pressure.

By reaching the Final this year, Bart's has regained some of its past glories after a lapse of too many years, so although such stalwarts as Tallack, Roche, and M. J. A. Davies will not be available next season, it is hoped that most of the remainder will form the nucleus of a side capable of bringing the Cup back to an honoured place in the College Library.

Finally, tribute must be paid to the referee, Mr. K. S. John of the London Society, who handled both Finals admirably, allowing the games to be enjoyed by players and spectators alike.

Team : As in photograph.

1st XV v. Old Millhillians. Lost 5 - 12.

For their first visit to Headstone Lane for some years Bart's were missing six of their Cup side, including Mackenzie and Phillips who were both in the Middlesex party visiting France. Considering this fact, the team did well to hold a powerful Millhillian side, which included England scrum-half J. Williams and England Trialist J. Roberts, to 3-0 at the end of a scrappy first half. In the second half however the Old Boys got well on top and added three unconverted tries, before a spirited Bart's rally in the last 10 minutes was rewarded with a try by Boladz, after a long run by Halls. This try was converted by Badley.

Team : B. W. D. Badley ; J. Plant, G. J. Halls, M. Britz, D. A. Lammiman ; R. R. Davies, B. Richards ; J. C. Dobson, C. J. Carr (Capt.), D. A. Richards ; W. P. Boladz, K. E. A. Norbury ; R. P. Davies, R. Jones, A. H. Thomas.

INTER FIRM SEVEN-A-SIDES

The Firm Seven-a-sides were played at Chislehurst on Saturday, March 30th, in beautiful weather, and with a proportion of the spectators and players mellowed by Cambridge's earlier victory in the Boat Race.

The early rounds resulted in the third-year pre-Clinicals playing the Midder and Gynae representatives in the final. There was a certain lethargy evident in some of the games but the final was played at a very hearty pace. Perhaps the cool of the evening had something to do with it. The Midder and Gynae side duly confounded the prophets by winning 8 - 5, tries being scored by Dale and M. J. A. Davies (one conversion) against a try by H. Thomas converted by G. Halls for the third year preclinicals. M. J. A. Davies always looked dangerous for Midder and Gynae and the remaining players nullified the dangerous pre-clinical attack with courageous tackling. Altogether a rather desperate affair with the result in doubt until the final whistle, as distinct from the rather lighthearted frolics we had witnessed previously.

The Housemen v. Registrars match resulted in a win for the Registrars by 11 points to 3. Perhaps the various temporary beards worn by the Housemen proved more to their detriment than advantage, but after the first loose scrum many of them were abandoned, if involuntarily. It soon became evident that the Housemen intended to counteract the heavier Registrar's pack by sheer numbers. Packing a sturdy 3-2-[illegible] or more

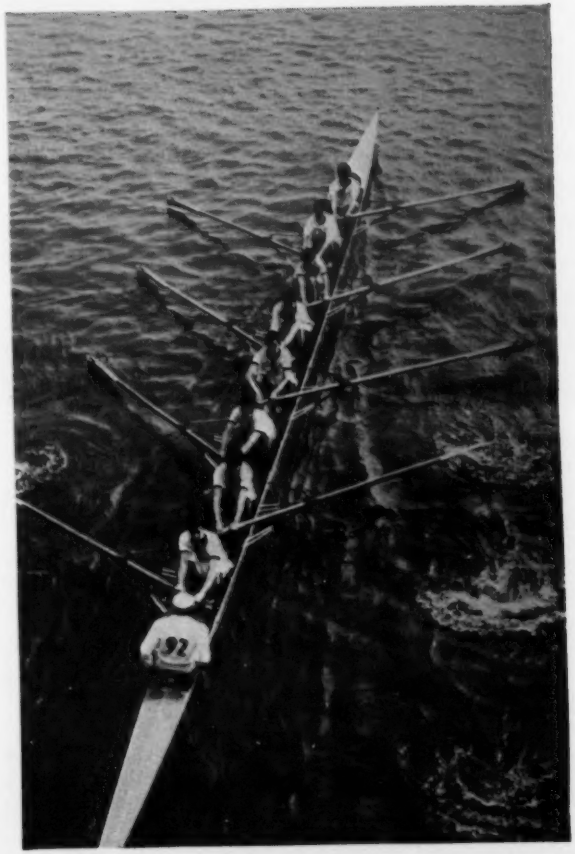
CUP FINAL

L. R. Thomas comes in for a tackle.

B. W. D. Badley taking a penalty.

D. W. Roche gets the ball in a line-out.

A 12 Square Metre Sharpie.



The First Eight.

on occasions) they had to rely on desperate corner flagging or their opponents' mistakes (usually the latter) to keep their line intact. Picton Thomas scored early on for the Registrars, Havard failing to convert and later M. J. A. Davies was allowed to run almost the whole length of the field to score, much to the chagrin of the crowd. In the second half the majority of the House beards were discarded, and a crisp blind side move ended in a try by Tait. However, this triumph was short-lived as a further converted try by MacNab Jones settled the issue.

So ended a most enjoyable afternoon's entertainment which was concluded in the traditional way with a dance in the pavilion.

SEASON 1956-57.

Colours have been awarded to the following: W. P. Boladz, A. B. McMaster, J. W. B. Palmer, B. Richards, D. A. Richards and A. P. Ross.

Colours have been re-awarded to: B. W. D. Badley, C. J. Carr, J. C. Dobson, M. J. A. Davies, R. R. Davies, G. J. Halls, J. C. Mackenzie, D. A. Lammiman, R. M. Phillips, D. W. Roche, J. S. T. Tallack, A. H. Thomas and L. R. Thomas.

ROWING

HEAD OF THE RIVER RACE

The Head of the River Race took place this year on the 23rd March, the week before the Boat Race. It was rowed under good conditions on a warm sunny day with a following wind over most of the course. There were 280 crews entered for the race, a greater number than there has ever been in previous years.

The hospital entered three crews, the first two being trained and the third being a collection of gentlemen who gallantly turned out for the occasion. The crews entered were as follows:

1st VIII—
Bow. A. I. Wilson.
2. J. G. Diamond.
3. L. K. H. Therkildsen.
4. B. P. Harrold.
5. J. R. Strong.
6. R. France.
7. E. M. C. Ernst.
Stroke. J. Bootes.
Cox. J. C. Rice.

2nd VIII—
Bow. R. G. Wilson.
2. A. C. Howes.
3. J. M. Lewis.
4. H. B. Dixon.
5. A. J. Lines.
6. W. H. F. Thomson.
7. R. H. Fell.
Stroke. R. S. Edmondson.
Cox. J. J. Wilson.

3rd (Gentlemen's) VIII—
Bow. D. King, Esq.
2. A. Ellison, Esq.
3. J. J. D. Bartlett, Esq.
4. E. J. B. Makin, Esq.
5. C. C. H. Dale, Esq.
6. G. M. Besser, Esq.
7. G. D. Stainsby, Esq.
Stroke. K. R. Bowles, Esq.
Cox. J. U. Watson, Esq.

The 2nd VIII was attacked by an epidemic of German measles about a fortnight before the race but were fortunate enough to get all their members back in time to finish training for the event. This year both the 1st and 2nd VIIIs went out every day in the last week before the race and did daily exercises in the gym for 10 days before that.

In the race itself the 1st VIII started well. Putting in 36 strokes in the first minute and settling down to a steady 32, No. 90 was soon passed and from Hammersmith to Fulham football ground the crew rowed beside No. 91, who were then passed and left about 2 lengths behind at the finish. The time for the course was 20 minutes 59 seconds.

The Results were as follows:

Boat I. (No. 92). 20 mins. 59 secs. Finished 83. Placed 102 in 1956.

Boat II. (No. 192). 21 mins. 50 secs. Finished 188. Placed 221 in 1956.

Boat III. (No. 272). 22 mins. 9 secs. Finished 252. No. IIIrd. VIII entered in 1956.

It is encouraging to note that six members of the 2nd VIII had had no rowing experience before November 1956.

1st XI v. Middlesex Hospital. Won 5 - 2.

Bart's kicked off in this our first game against the Middlesex Hospital for two years and during the first half played "up the hill." This however did not prevent repeated attacks on the Middlesex goal and was eventually rewarded when our outside left Tchamannoff scored with a crisp right-foot drive which left the opposition goalkeeper helpless. It was not long before Bart's again added to their score, this time Gould being on hand to force home a splendid forward pass.

The Bart's goal had seldom been threatened during this period due to the splendid defensive covering of the full-backs Prosser and Kennedy and the sterling stopper at centre half, Juniper. This defensive trio found an impregnable barrier in front of the Bart's goalkeeper which was a very good thing, since the goalkeeper, who was usually seen in the inside forward position, had never played in goal before in his life.

The second half started with Bart's still leading 2 - 0 and soon Gould added our third goal despite vain efforts by both full-back and goalkeeper to prevent a score. Middlesex, however, were not to be denied a score. Following a passing movement amongst their forwards their outside right managed to force home the ball through a narrow gap between our goalkeeper and the post—much to the surprise of the goalkeeper and the post!

Following this reversal Bart's swung to the attack again and soon our outside right Carr had scored our fourth goal. A left-foot centre-cum-shoot from the angle of the penalty box floated nonchalantly past the opposition goalkeeper and finished in the back of the net.

Middlesex fought back but most of their efforts broke down in midfield because of the tight

Psyche-cum-soma

Cupid, you will remember, deserted Psyche; and I occasionally wonder whether it was not so much because she asked awkward questions as because he discovered that she was one of a pair of Siamese twins. For though it was easy enough for Cupid to leave Psyche, Psyche, poor girl, can never leave Soma. Yet to their Siamese twinship — the twinship of mind and body—we are often, like Cupid, blind.

Of course in one sense, we know quite well that our minds are constantly influencing our bodies. Suppose I ask you to think of a lemon — to remember how it smells, how it feels when you cut it with a sharp knife, and what it tastes like when you let your teeth sink into it, as we used to do at halftime. Unless you are unusually weak on imagination your mouth will water. But not because I have in fact handed you . . .

Fascinating, but owing to a shortage of space, unfinished. The complete essay, which appeared originally in The Times, *is one of a collection of meditations by this celebrated medical essayist. We will be delighted to send you a copy of "The Prosings of Podalirius". Just send a card to the address below.*

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marking and terrier-like tackling of the Bart's wing halves, Smith and Noble. It was from a pass from the half backs that Gould scored our fifth and final goal. A pass found Gould just outside the penalty box and beating off one tackle he fired in a low cross shot which completely beat the goalkeeper.

In reply to this effort Middlesex launched repeated attacks and finally scored their second goal, again through their outside right. From the right wing 10 yards from goal he sent over a harmless-looking centre which suddenly sailed into the net just under the cross bar.

Team: R. Pilkington; D. Prosser, R. Kennedy, M. Noble, C. Juniper, R. Smith; C. Carr, D. A. Birkett, A. Gould. L. Iregbulam, S. Tchamannoff.

HOCKEY

HOSPITAL CUP SEMI-FINAL

1st XI v. The London. Lost 4 - 3.

We were lucky to have an almost fine day for this match after a series of cancellations, and the ground, although not ideal, was not as heavy as anticipated.

Bart's started badly, but soon settled down and in fact in the first half had most of the play. Our goal was only once in danger but Doherty saved at the last minute at full stretch. The two backs, Nichols and Goodwin, were largely responsible for keeping out the very fast and penetrating London forwards. Not long before half time, Drinkwater opened the scoring from a good short corner.

In the second half, the London got more active and their three inside forwards time and again split open our defence. This happened soon after half time and Doherty, left on his own, was beaten. Bart's lost no time, however, in scoring again, and a nice forward movement culminated with Anderson making the score 2 - 1 a minute later. From now on the London forwards made attack upon attack on our goal, but some terrified 'scratching' by the Bart's defence somehow managed to prevent them scoring, until a muddled defence gave the London their equaliser.

Later their right wing got away and sent a hard centre to their inside left. The shot was saved by Doherty, but before he could recover, the London had scored again, making it 3 - 2. Ten minutes from the end, Bart's again scored. This time from a long corner. Tabor hit the ball in the air and Drinkwater neatly followed it in: 3 - 3. Annoyingly quickly after this, the London scored the winning goal when Doherty saved one shot, but was caught (and held) on the ground, while the London pushed the ball gently into an open goal.

A very good game and surprisingly fast for the conditions. One felt, however, that the whole Bart's side could have done much better and had the match been played earlier on in the season, as originally planned, the result might have been different.

Team: R. P. Doherty; C. S. Goodwin, J. B. Nichols; D. Godwin, E. J. Batterham, N. C. Roles; J. R. Nicholson, A. S. Tabor, A. S. Anderson, P. Drinkwater, D. R. Dunkerley.

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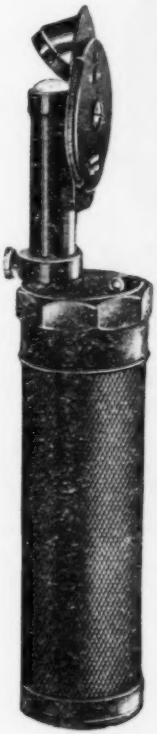

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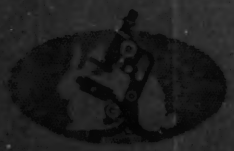

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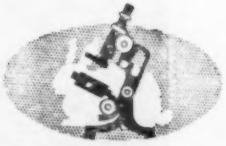

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